Vol. 88, *No.* 5 New York, July 31, 1926 *Pages* 207-256

L. W. W. MORROW
Managing Editor
EARL E. WHITEHORNE
Commercial Editor
F. C. WELLS
News Editor
EUSTACE C. SOARES
Assistant Editor
F. R. INNES
Assistant Editor
L. H. CHURCH
Assistant Editor

Electrical World

The Consolidation of Electrical World, Electrical Engineer and American Electrician

W. H. ONKEN, JR., *Editor*

ALLEN M. PERRY
Western Editor
7 South Dearborn St., Chicago
H. S. KNOWLTON
New England Editor
88 Tremont St., Boston
WALTER C. HESTON
Pacific Coast Editor
883 Mission St., San Francisco
T. P. KINDIG
Assistant Editor
401 Guardian Bldg., Cleveland
PAUL WOOTON
Washington Correspondent
Colorado Bldg., Washington
R. L. SHEPHERD
Southern Editor
Alabama Power Co. Bldg., Birmingham

Contents of This Issue

Editorials 207

Frontispiece—John C. Parker, Jr. 210

A Fight Against Odds 211

An interesting article telling how by courage, hard work and good management the Appalachian Power Company built up a self-sustaining and profitable business enterprise in the mountains of West Virginia.

Electric Annealing at Walworth Plant 215

BY J. L. FADEN AND J. D. MCMANUS.

An analysis made in the plant of the Walworth Company, which has participated in many great innovations that have revolutionized modern industry, shows a saving by the use of the electric furnace over that of the oil furnace.

Central-Station Operations 12.9 per Cent Over Last Year 218

Russian Plans for Dnieper River Hydro-Electric Development 220

BY L. H. BAUER.

Electricity in the Home 221

BY H. W. HILLMAN.

A twenty years' survey by the inventor of the house without a chimney, in which he tells what the electric oil heater means to home owners and central stations and gives data on costs and servicing.

New Tandem Rolling Mill Control 223

BY P. B. HARWOOD.

A description of the application of motors in tandem to the operation of small rolling mills with some details of the electrical control equipment used.

Letters from Our Readers 224

Central Station and Industrial Practice 226

Operating Induction Regulators in Series-Parallel 226
Automatic Pump Stations at Grade Crossings 227
Holding Down Expense of Installing Meters 227
A Modern Load Dispatcher's Board 228
Flexible Load Device for Routine Meter Testing 229

Commercial Activities and Public Relations 230

Second Floor Auditorium Proves Good-Will Builder 230
Public Drinking Fountain Makes Substation Attractive 230
N.E.L.A. Gets Out Appliance Advertising Plan 230
Keeping Special Records of Large Power Installations 231
Icemen and Central Station Co-operate 232
Demonstration Unit Aids Appliance Sales 232

Digest of Electrical Literature 233

News of the Industry 235

Men of the Industry 242

Court Decisions and Commission Rulings 244

Financial and Corporate 245

Manufacturing and Markets 249

Business Conditions 251

Activities of the Trade 252

New Equipment Available 253

Construction News 254

Electrical Patents 256

McGRAW-HILL PUBLISHING COMPANY, INC., Tenth Ave. at 36th St., NEW YORK, N. Y.

JAMES H. McGRAW, President
JAMES H. McGRAW, Jr., Vice-Pres. and Treas.
MALCOLM MUIR, Vice-President
EDWARD J. MEHREN, Vice-President
MASON BRITTON, Vice-President
EDGAR KOBAK, Vice-President
C. H. THOMPSON, Secretary

WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn St.
PHILADELPHIA, 16th and Parkway
CLEVELAND, Guardian Building
ST. LOUIS, Star Building
SAN FRANCISCO, 883 Mission Street
LONDON, 6 Bouverie Street, London E. C. 4

Cable Address "Machinist, N. Y."

Publishers of
Engineering News-Record — American Machinist
Power — Chemical and Metallurgical Engineering
Coal Age — Engineering and Mining Journal
Ingeniería Internacional — Successful Methods
Bus Transportation — Electric Railway Journal
Electrical World — Electrical Merchandising
Industrial Engineer — Radio Retailing
Journal of Electricity
(Published in San Francisco)
American Machinist—European Edition
(Published in London)

Member Audit Bureau of Circulations
Member Associated Business Papers, Inc.
Circulation of this issue, 20,075

The annual subscription rate is $5 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala, Haiti and Paraguay. Extra foreign postage, $4 (total $9 or 38 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.
Change of Address—When change of address is ordered the *new* and the *old* address must be given. Notice must be received at least ten days before the change takes place.

Copyright, 1926, by McGraw-Hill Publishing Company, Inc.

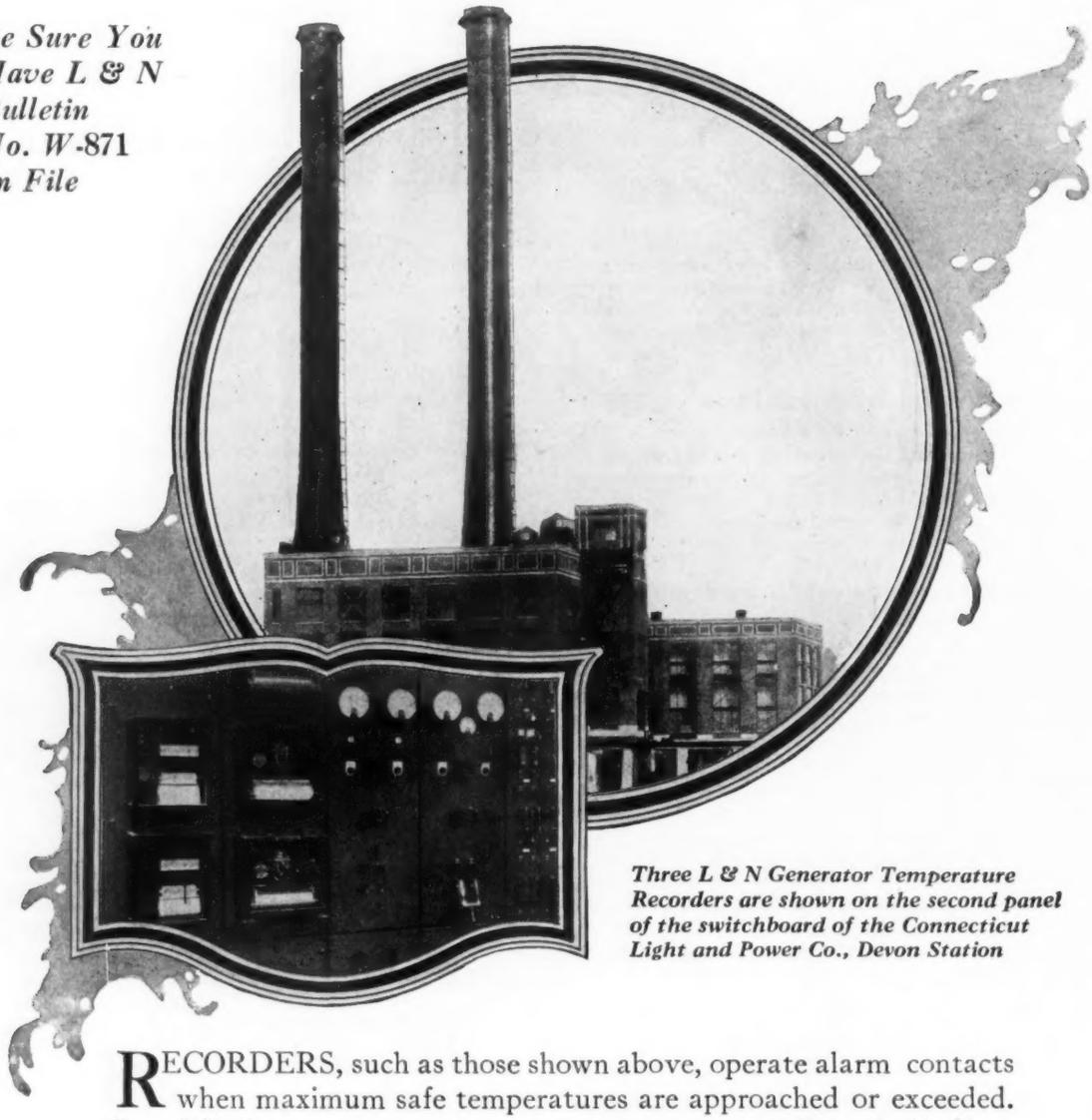
Published weekly

Entered as second-class matter Jan. 20, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.
Printed in U. S. A.

Advertising Index—Alphabetical, 92; Classified, 86, 88, 90; Directory of Engineers, 42, 43; Searchlight Section, 44-50

Connecticut Light and Power Co.
Devon Station

Be Sure You Have L & N Bulletin No. W-871 on File



Three L & N Generator Temperature Recorders are shown on the second panel of the switchboard of the Connecticut Light and Power Co., Devon Station

RECORDERS, such as those shown above, operate alarm contacts when maximum safe temperatures are approached or exceeded. For full data on generator temperature recording, indicating, signaling and controlling equipment, see Bulletin No. W-871.

LEEDS & NORTHRUP COMPANY
4901 STENTON AVENUE, PHILADELPHIA

LEEDS & NORTHRUP

Electrical World

Published by McGraw-Hill Publishing Company, Inc.
W. H. ONKEN, JR.
Editor

VOLUME 88 — *New York, Saturday, July 31, 1926* — NUMBER 5

Incandescent Lamp Pioneer Passes Away

ANOTHER outstanding figure in the electrical industry has been removed by death, Franklin S. Terry, a pioneer in the incandescent lamp business and one of the organizers of the National Electric Light Association and of the National Electric Lamp Company. While the merging of many competing lamp companies into one producing and selling organization merely showed Mr. Terry's bent for organization, he possessed other attributes just as constructive and a personality which won for him the affection and hearty co-operation of associates and employees in the lamp business.

F. S. Terry was primarily a developer of men. He encouraged initiative and individuality, giving responsibility to those who merited it and authority with the responsibility. Above all he inculcated into the hearts and minds of executives and employees alike a spirit of loyalty and human co-operation which verged on the ideal. Corporations, however large, may possess souls. People are not, as a rule, harsh or unjust with those they know, and Mr. Terry saw to it that his people knew one another. Men have wondered at the organization spirit manifested at Nela Park; at the liking of National lamp men for their company and the pride they take in their job. Human relations is back of it all. Harmony is one of the ideals of the National Lamp Works, and this was attained by Mr. Terry through comradeship of individuals, expedited and enhanced by close contact and play at Association Island. Mr. Terry's interpretation of efficiency and responsibility was predicated on human beings and the thoughts of human beings. He recognized that their working life is an integral part of their living and that so far as he was concerned it was his duty and responsibility to see that that life was a good life. He prospered because he held his organization together by ties not merely of self-interest but of mutual loyalty and affection, and for that reason also he is missed and will be missed by all who knew him.

Collective Action May Remove Industrial Load Barriers

PROGRESS which is being made in developing industrial loads, particularly heat applications, may be satisfactory to some central-station companies, but it is not so great or so rapid as it should be. Something is fundamentally wrong chiefly because most industrial concerns do not keep production-cost accounting systems that enable them to compare the economy of old and new methods, processes and equipment. Accounting systems they have, but they are either superficial or so illogically constructed that few managers of industrial works can tell how a specific process or piece of equipment is affecting the items that make up production costs, quality, production rate, etc.

If adequate accounting systems existed more generally, there would not be the difficulty of convincing industrial customers of the inadequacy or costliness of old equipment or methods for which modern substitutes have been proposed by electric service companies and manufacturers. With a proper accounting system many industrial customers could with the aid of utilities and manufacturers figure for themselves the economy of new applications. At present they include only the obvious costs or advantages and not those less obvious but still directly chargeable.

If industrial executives would urge in their respective industry associations greater consideration of cost accounting and to recommend committees which would outline principles to consider in inaugurating production cost systems, more extensive use of adequate systems would result. But the desired result will not be forthcoming unless every utility company undertakes to get industrial support of cost analyses inside industrial circles. If nothing else results such action would make many industrial customers more receptive to cost analyses such as utility companies find necessary in developing industrial loads.

Ambassadors to Industry

QUICKENING interest in public utility sales problems and policies on the part of executives is one of the best signs of the times in the central-station world. There are many reasons for this which need not be repeated at the moment, but when these factors in progress come to be weighed, the power-sales engineer will be found among the most important. It is not many years ago that these rising young specialists devoted arduous days, and often nights, to indicating steam engines, estimating heat balances in industry and computing the economies of electric motor drives in place of belted installations run by slow-turning prime movers. With the electrification of industry came new responsibilities. The heat-balance problems continued, but closer and more frequent contacts developed with old and new customers; power-factor studies entered the docket, and gradually an intimate knowledge of working conditions and problems peculiar to particular industries became a part of the power engineer's equipment and increased his value. So the time became ripe for the introduction of industrial electric heating; the power engineer rose to the occasion, went through the co-operative courses under N.E.L.A. and manufacturers' auspices and expanded his usefulness into a field whose final boundaries cannot be staked out at this writing.

A huge task awaits the power engineer as utility service to industry develops into still greater economic importance. In the best-managed central stations he

is a true ambassador to industry, seeking to render a larger and a better service on the one hand and to attack the perennial problem of costs on the other. Wholly aside from the capturing of additional load, however, the power engineer is coming into his own as an intimate adviser of industrial customers on contracts and rates, on the prevention of wastes and on public relations of utilities. It would pay to maintain a high-grade staff of power engineers in many substantial companies from now on if they never signed up another kilowatt of new business. Their association with industrial customers has become so valuable that capable managers are recruiting some of their best aids from these ranks. They will do so to a still greater extent in future. It may not be written of the power engineer that he shall inherit the earth; the accountants and some other specialists are showing their abilities and vigor as well—but among the key men of the electric light and power business these lately developed representatives of progressive policies in energy sales are to be reckoned with henceforth in a competition to obtain and to hold business. This healthful competition and the advancing quality of personnel which it denotes form one of the most wholesome situations in the electrical industry.

An Investment that Will Bring Returns

IN VARIOUS parts of the United States electric light and power companies are erecting or leasing modern office buildings or doing the next best thing—rehabilitating the old structures which customers must visit or see periodically and frequently. This is an encouraging trend and one which might well have started sooner had it not been for the large amount of money imperatively needed to amplify or improve generating, transmission and service facilities.

In attending first of all to the vital service of a utility any company has an excellent "alibi" for delaying the improvement of its office, but this alibi cannot continue forever. Especially is this true in any city or town where the office or the merchandise shop does not reflect what utilities stand for—namely, progressiveness, commercial activity, efficiency and stability; and there are still many district or local offices which are far from measuring up to the other standards of the companies concerned. Investments in local or district offices may not directly produce revenue like other utility investments, but the absence of adequate, attractive and convenient facilities can retard commercial and financial advancement and vice versa.

Where else can a utility invest money so well to prove its progressiveness without appearing extravagant? An unattractive, inconveniently arranged utility building standing among similar buildings is no asset to the utility, and if it stand among modern structures the same building is a liability. Does it tempt a customer to enter? Does it impress existing and prospective customer-owners of securities with the financial stability back of these investments? Does it make the domestic, commercial or industrial customer respect the utility's advice on more progressive ways of doing things? Does inefficiency in handling customers suggest that efficiency exists elsewhere in the organization? Do poor office facilities react favorably on the attitude and work of employees? Obviously not.

In the provision of modern offices and service buildings equipped with model electric lighting and electric power applications utility companies have the opportunity to improve their prestige, to show how offices, show windows and shops should be equipped electrically, and to build local good will by raising the standards of the business section. Many utilities have recognized these facts. Eventually all will do so.

Accident Analyses Show Where to Concentrate Precautions

ANY company which analyzes its accidents to ascertain their causes—and every company should—has a basis for determining where to concentrate its safety-first or accident prevention activities. This does not mean that laxity should be tolerated in connection with occupations showing few accidents. Foremen and employees in such work should be publicly commended or even distinguished for their safety standing, since commendation is often the means of maintaining or improving conditions as well as stimulating emulation by men engaged in other work.

The analysis of causes of accidents on the systems of the Hydro-Electric Power Commission of Ontario for the year 1925, as recently presented by F. A. Gaby, chief engineer, indicates that 21.5 per cent of the accidents were due to handling material, 19.7 per cent to handling tools, 16.4 per cent to stepping on nails or sharp objects, and a little more than 10 per cent each to (1) foreign substances in the eyes, (2) slipping, tripping and falling, and (3) being struck by falling bodies. Classified as to seriousness (or time lost) rather than number of accidents, slipping, tripping and falling caused 25.7 per cent of the lost time, falling bodies 19.3 per cent, collapse of earth, buildings, etc., 14.6 per cent, and handling material 12.8 per cent. The number of accidents per 1,000 full-time workers was 356, and the days lost per 1,000 full-time workers were 2,478.

If other companies have similar experience records, they indicate clearly the directions in which particular precautions should be taken by individuals, and especially by the responsible foremen, to reduce casualties. In any event, confronting foremen with experience records, emphasizing the most frequent causes of accidents and holding them responsible may work wonders in reducing accidents with their train of bad results.

Merchandising Costs Are Under Fire

TIME was when central-station managers were not concerned about profits—or their absence—on appliances, but that viewpoint is now changing in executive discussions of merchandising policies. Heads of appliance departments no longer go about their duties with the idea that it will not make much difference whether departmental profits disappear or not and the far-sighted departmental manager realizes that all his costs are going to be under fire soon if not now. Already a pretty vigorous barrage is being laid down by the "big guns" of the company in some quarters, and while this is no time for a stampede, it is the "zero hour" for fortifying the merchandising position with facts, figures and reasons for all outlays.

Close observation of the work of many appliance department managers shows that able service is being performed by these men, often under heavy handicaps. Year by year the volume of appliance sales rises in progressive companies and it is gratifying to note the appreciation of the importance of load-building appliances. However, the time is at hand for a searching of heart on such matters as overhead costs, the size and character of the local appliance markets, relations with distributors, factory branch offices, and dealers. It is all very well to buy washers, ranges and refrigerators in carload lots, but there are cases where the market needs to be gaged more carefully and the possibilities of closer relations with regional distributors investigated before the lure of large but not always profitable discounts is allowed to sway so much utility buying. Closer supervision of personnel and better training of departmental representatives are also becoming vital issues, as well as the design of electric shops and displays. Probably the tendency for appliance departments to be charged "all the traffic will bear" will be continued by the accountants, but this can be met effectively if clear-cut sales policies and methods are combined with first-class administration by departmental heads.

Relamping Campaign as a Revenue Builder

SURVEYS have shown that the total wattage of lamp bulbs in the average home at the present time is not more than half as great as it should be to provide the householder with adequate and convenient utilitarian lighting. They have also shown that there are many empty sockets due to neglect by the customer in purchasing needed lamps. Many electric service companies have conducted relamping campaigns with success. One company with more than three hundred thousand residential customers sold lamps averaging 60 watts in size in such a campaign. When it is remembered that the average wattage per socket in the home is at present about 44, it is seen that this is an enormous rate of increase, though still below what is needed. This company added an average of 35 watts per residence. If these watts are "active" three hours a day, it means, at 7 cents a kilowatt-hour, an increase of $800,000 additional gross revenue per year for all the residential customers on this company's lines.

The average residential customer represents an investment of approximately $100 to the central-station company, and the average annual revenue per residence is about $28. A turnover once in four years is nothing to boast about in business. Improved lighting requires little expenditure and relamping virtually none on the part of the customer. Thus increasing the lamp wattage or lighting load is one of the most attractive means of increasing residential revenue. The increase is almost entirely net profit and turnover is improved.

In lighting little things accomplish big results. Small expenditures on the part of the customer bring much cheer, comfort and convenience. Similarly, effort on the part of the central-station company is amply remunerated. Lighting is in such a state of underdevelopment that for a long time to come everybody—customer, dealer and central station—will profit by its advancement.

Getting Closer to the Farmer

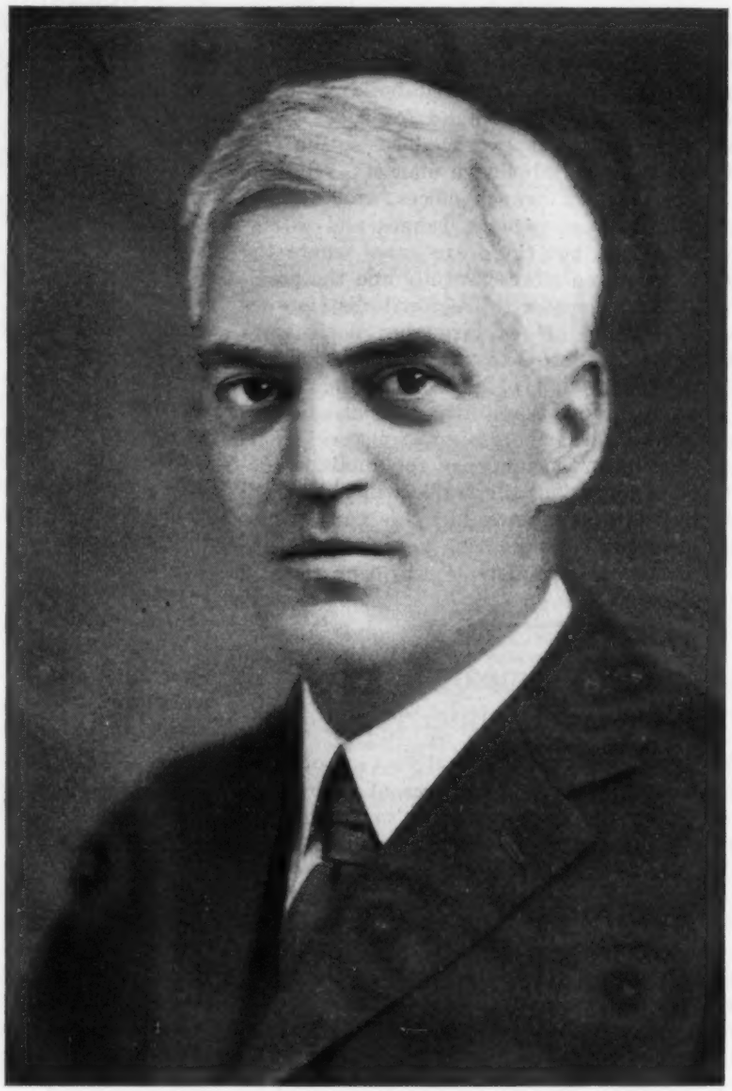
ENCOURAGING evidence that the electrical industry and the farmer are rapidly coming into closer relations for mutual good can be seen by every careful observer of the rural electrification movement. Many major problems remain unsolved in this development, to be sure, but through co-operation within the industry and personal attention to the farmer's needs by electrical representatives in the field marked progress is being made toward securing more definite data upon energy requirements for a multitude of farm applications; the economic issues controlling the use of electric service in agriculture are being clarified, and the public relations side of farm supply by light and power companies is receiving much-needed attention. Competent managers are on the alert to find out the best methods of spanning the gap between urban and rural customers, and every day the value and importance of personal contact with the farmer is being demonstrated.

Too many dangers of misunderstanding still beset the path of progress, however, to warrant complacency on the part of the utilities. Political attacks are threatened in some cases where the line extension problem bristles with cost difficulties; the financing of farm equipment needs the wisest study; there is in some territories too little knowledge of the limitations of electricity and of its possibilities as well as in farm work; rates are far from standardized, and much remains to be done in adapting the lessons of electric service on large and prosperous farms to the purchasing power and use-capacity of medium-sized and smaller establishments. The farm problem has reached a point in many companies certainly where it cannot be allowed to drift along as a side issue in the daily affairs of the utility. The call for agricultural engineering talent is growing louder in utility sales departments, and the attention of both executives and specialists is being demanded. Within the industry, also, the need is imperative of closer co-operation between manufacturers, power companies and wiring contractors in order that equipment shall meet the severe service demands of the modern farm with satisfaction to all concerned.

A volume could be written upon the major problems of rural electrification, but who can doubt that many of these will be solved within the coming decade? It is too much to expect that all the dark spots on the rural service map can be made light, but through joint pole occupancy, better quality of line construction in some cases, sound methods of financing, a more intimate study of loads and energy consumption on classified branch circuits separately metered and faithfully recorded in farmhouse and outbuilding use, and by pushing long-hour applications and regular repetitive services like pumping, refrigeration, cooking and ironing advances are being made that will in time overcome many formidable difficulties. Too much emphasis cannot be laid upon the importance of personal contact with the farmer at all stages of this development, and a first-hand understanding of his daily problems is vital to any real success in lightening farm burdens electrically. Neglect of electric farm installations after service begins is perilous in the extreme in this era of development, if indeed it ever will be tolerable. Here is a real challenge to the industry's ablest economic and engineering skill, and no one but a pessimist can doubt the outcome.

John Castlereagh Parker, Jr.

An engineer, educator and utility executive whose work and personality have made a deep impression on the electrical fraternity.

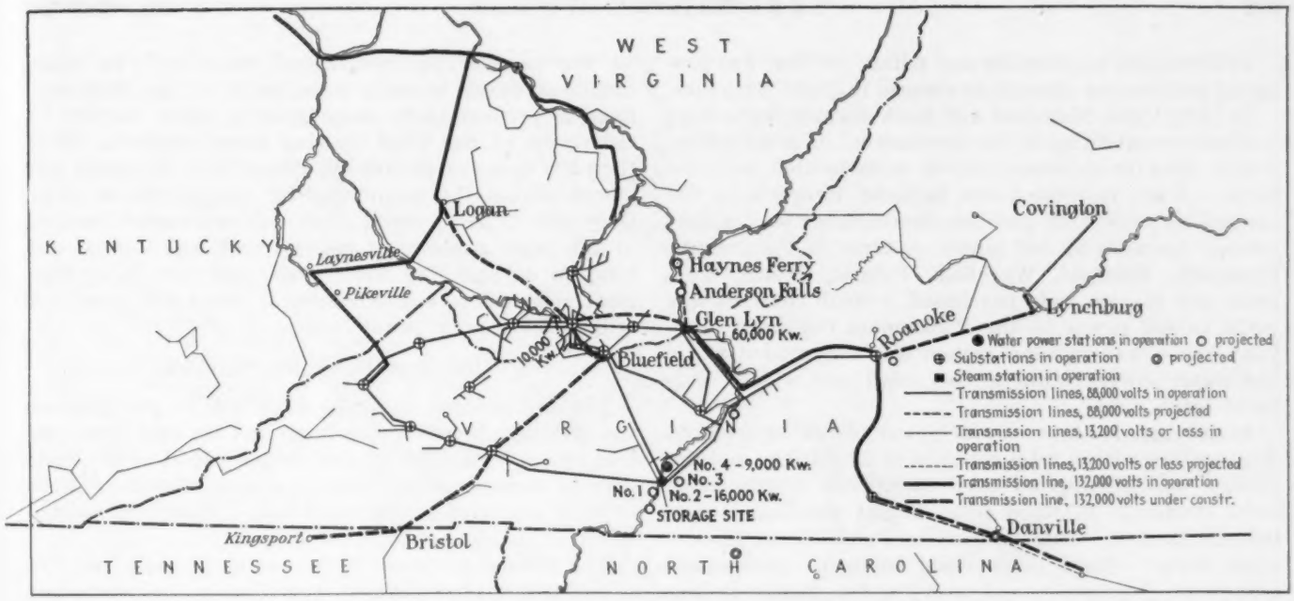


THE many aspects of the light and power business make it necessary that its executive officers be men of versatility with broad and deep knowledge and experience and with the personal qualities necessary to the development and maintenance of good company and public relations. John Castlereagh Parker, Jr., vice-president of the Brooklyn Edison Company, qualifies as this type of utility executive with a very high score. Wide experience as an educator, business man, engineer, employer and public servant has served to mellow a delightful personality and to fit him both to cooperate with his fellow workers in the industry and to help the public to understand its policies and aims.

Born in Detroit on April 15, 1879, he matriculated at the University of Michigan, where he specialized in mathematics and physics, receiving his B.S. degree in 1901, his A.M. in 1902 and his E.E. in 1904. His first job was with the General Electric Company, and this was followed by teaching at Union University. In 1904 he was made an assistant to the chief engineer of the Ontario Power Company at Niagara Falls; later he was assistant to F. B. H. Payne of the Niagara, Lockport & Ontario Power Company, where he was connected with the installation of the first 60,000-volt line to be built in this country. From 1906 to 1915 he was engineer of the Rochester Railway & Light Company, and in this position he broadened his activities to cover rate making, power sales and business aspects of the utility business.

In 1915 Mr. Parker was called to the University of Michigan as professor in charge of the department of electrical engineering. He remained at Ann Arbor until 1922, when he became electrical engineer for the Brooklyn Edison Company. A complete rebuilding program for this property called for hard work and executive and engineering talent, and Mr. Parker's demonstrated ability in helping to carry through the task led early this year to his becoming vice-president in charge of engineering.

During the past year Mr. Parker has been chairman of two major N.E.L.A. committees and of the power generation committee of the Association of Edison Illuminating Companies. In addition, he has been a member of several standards committees and of committees of the A.I.E.E., of which he is a fellow and past vice-president. He belongs also to the A.S.C.E. and the A.S.M.E. and to numerous social clubs and Greek letter societies.



ORIGINAL TRANSMISSION SYSTEM OF THE APPALACHIAN POWER COMPANY—1914

A Fight Against Odds

Appalachian Power Development Unique in Many Respects—A Wilderness Load-Building Program Goes Over—Construction and Service Adapted to Changing Conditions

ABOUT 1912 there started a utility development down in the mountains of West Virginia that has many unusual features. A water-power site many miles from load, the load available consisting largely of coal mines already operating with their own plants, a mountainous country with few roads so that rights-of-way were best obtained by laying a ruler across a map and a large investment in lightly loaded high-tension lines were some of the elements that introduced handicaps difficult to overcome.

But courage, hard work and good management won the battle and the Appalachian Power Company recently joined the ranks of the American Gas & Electric Company as a self-sustaining and profitable business enterprise and as an important property in a large interconnected group. Bluefield has long been headquarters for the company. This town of 25,000 population is on top of the Appalachian Mountains, a center for the great coal fields in the near-by territory and the headquarters of the former Appalachian Power Company. A visitor here is privileged to risk his life when driving over mountain roads and to see scenery of unparalleled beauty. On these trips the impression is gained that each high point has a steel transmission tower outlined against the sky, and conductors bridge the valleys in spans of astonishing length. The construction of lines in the territory is a hand assembly, because few roads are available and because the mountains are so steep that men carry the tower equipment piece by piece to each location and each structure is erected as a separate job.

On the hillsides and in the valleys of the region are located small hamlets that house the workers for the coal mines. These groups are busily engaged in producing a large output of the best bituminous coal in America. Small cities such as Bluefield, Princeton, Welch, Pulaski and Saltville are centers of activity—for mine and railroad workers and some other industrial developments of a variety of types have recently been added to the assets of the region.

Talks with editors, city managers, lawyers, mine owners and citizens developed a very romantic story of utility growth that spoke well for the utility management. These reactions proved that it had established good public relations by giving service and by cooperating in all civic developments to benefit the community it served. And a visit with Herbert Marble, the hospitable general manager of the Appalachian Power Company, and his corps of able associates served still better to establish basic facts and give a human background indicative of the conditions connected with this unusual utility development.

How the Project Started

What the founders of the Appalachian Power Company set out to do was to invade a wilderness, develop water powers, build a transmission system and supply power chiefly to widely scattered coal mines already operating with their own plants. And this when coal on the market was only 90 cents a ton and about as valuable as so much dirt to the mine owner in his own power house.

This was the engineering and selling job that was projected and carried through to success in about ten years.

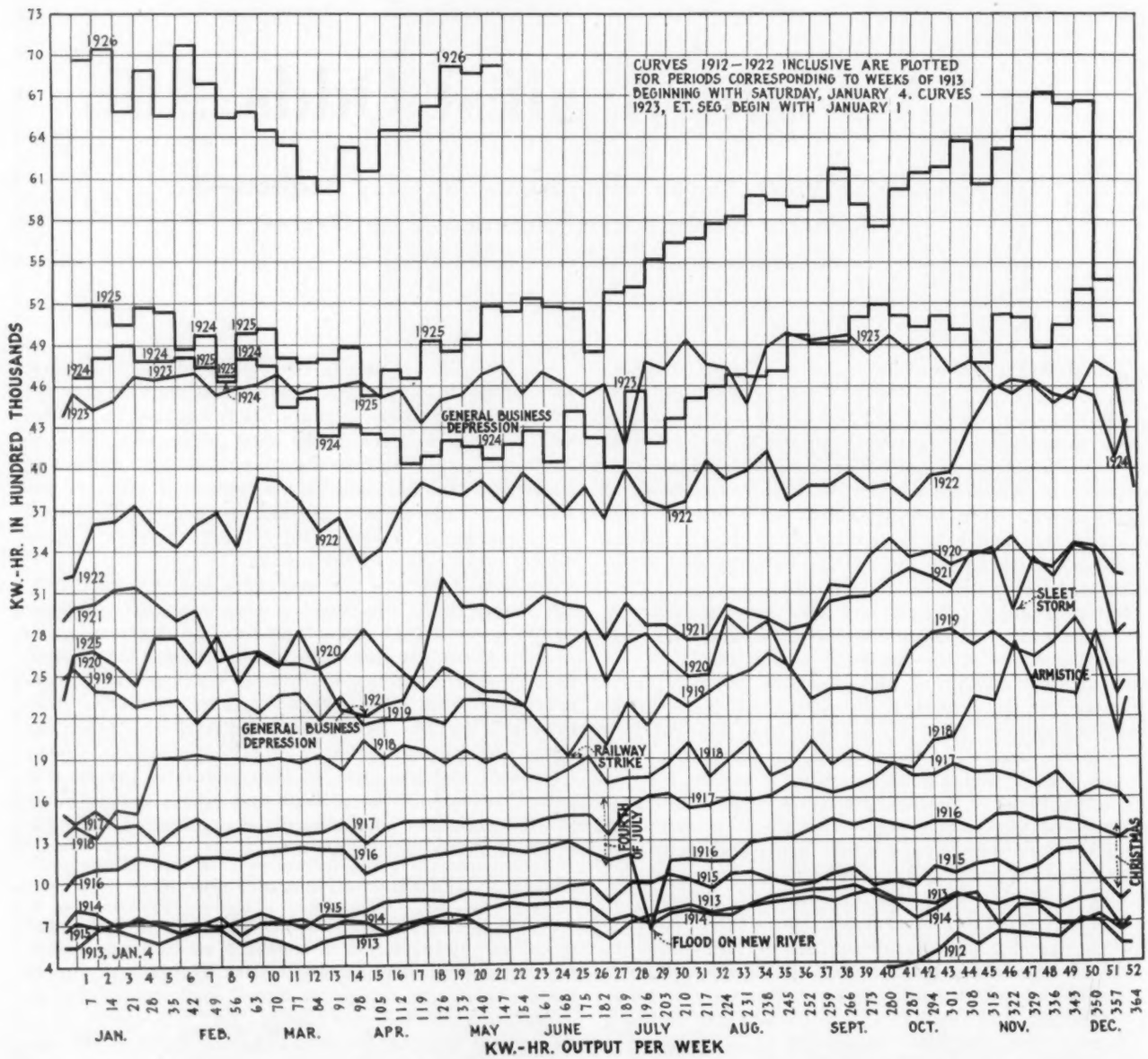
In 1911 Viele, Blackwell and Buck decided there were business possibilities in the development of some water-power sites they owned which were located on New River. They interested the Byllesby interests in the project as associates and the development was undertaken. Local light and power systems in Pocahontas, Bramwell, Bluefield, Wythfield, Pulaski, Welch, Keystone and Marion were purchased, a small contract was made to sell power to the Pocahontas Collieries Company and a transmission system was constructed to tie the water-power plants to the small and widely scattered loads.

In October, 1912, two water-power plants were placed in operation with a total capacity of 23,000 kw. and the energy was distributed over 88,000-volt transmission lines stretched on wood poles across the valleys and mountains of the roughest territory east of the Mississippi River. Wood poles, wood wishbone cross-arms, aluminum conductors and every other money-saving expedient were utilized to secure an adequate structure for the service requirements of the time. In some instances heavy weights were hung on the aluminum lines to prevent them from creating short circuits by the action of the wind blowing them together. More than 237 miles of 88,000-volt line of this character was placed across the mountains by the middle of 1913. Only this type of installation was warranted because of the acute problem of getting sufficient load of any kind to support the investment, and yet these lines gave splendid service for several years and some are still in service for minor loads.

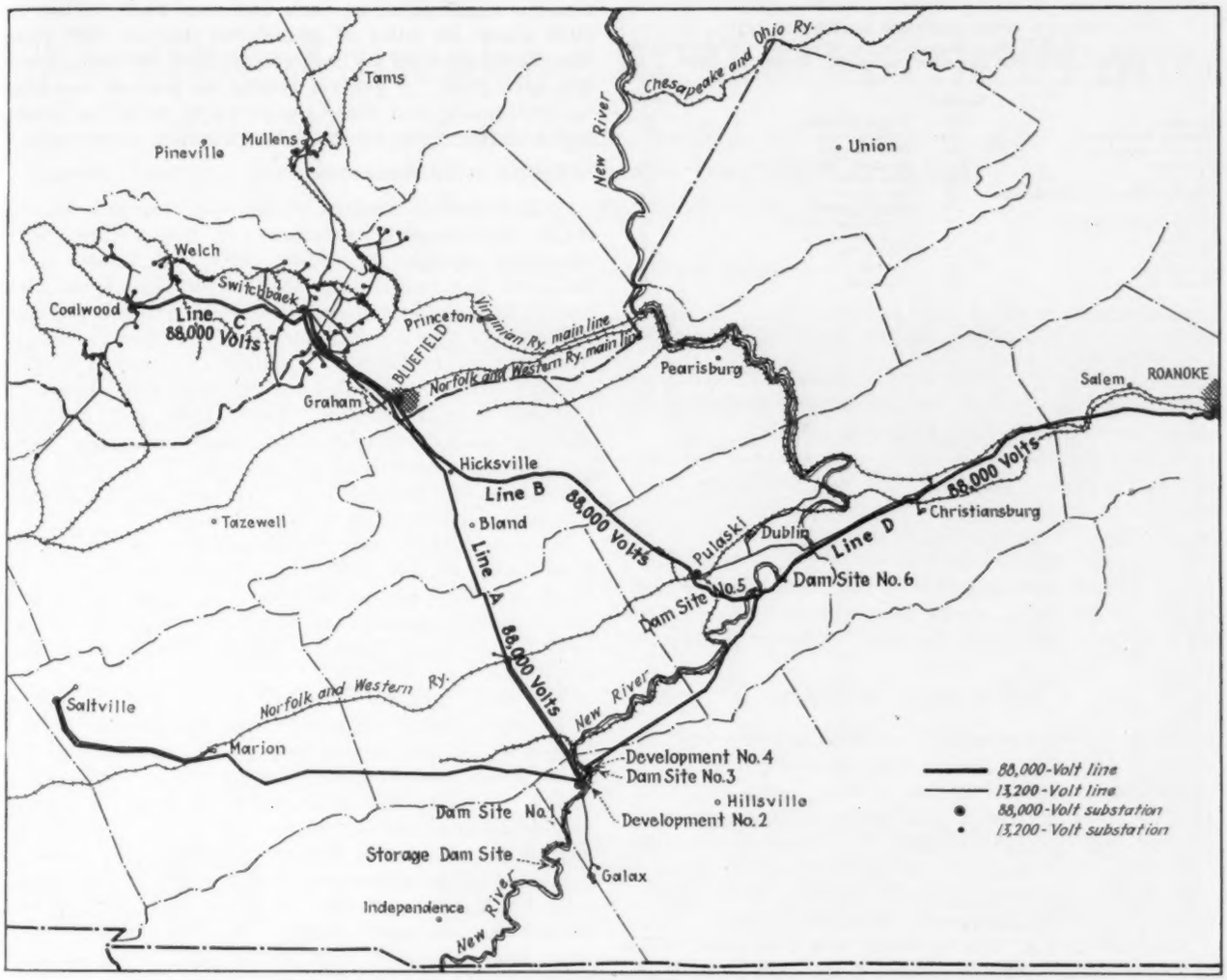
THE LOAD-BUILDING PROBLEM

The big problem in those days was to get loads on the system. Nearly every mine had its own plant and was owned by a different individual. Most of the mine owners were practical men of affairs who knew little of their power costs and cared less. What they wanted was coal tonnage at least cost.

The selling job done to coal mine owners was less a business matter than it was a study in psychology and patience. Very few if any mine owners were sold on


CURVES 1912–1922 INCLUSIVE ARE PLOTTED FOR PERIODS CORRESPONDING TO WEEKS OF 1913 BEGINNING WITH SATURDAY, JANUARY 4. CURVES 1923, ET. SEQ. BEGIN WITH JANUARY 1
GENERAL BUSINESS DEPRESSION
GENERAL BUSINESS DEPRESSION
RAILWAY STRIKE
FOURTH OF JULY
FLOOD ON NEW RIVER
SLEET STORM
ARMISTICE
CHRISTMAS
1913, JAN. 4
KW.-HR. IN HUNDRED THOUSANDS
KW.-HR. OUTPUT PER WEEK
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

GRAPH SHOWS HOW THE KILOWATT-HOURS OF THE SYSTEM HAVE INCREASED FROM YEAR TO YEAR



PRESENT APPALACHIAN ELECTRIC POWER COMPANY SYSTEM AS PART OF THE INTERCONNECTED SYSTEM OF THE AMERICAN GAS & ELECTRIC COMPANY

central-station power through the cold facts produced by an economic analysis in dollars and cents, because data were not available. Each job was an individual case of selling. In some instances the mine plants wore out. At one mine the plant force used limbs of trees to keep stacks and breeching upright in order to impress the boss with the fact that repairs were in order. This was a psychological moment for the successful selling of central-station power. In other cases the local plant blew up and the utility served as a service pinch hitter. In still other instances the bother of operating a power plant was the chief element in causing the mine owner to buy power. Another amusing case occurred in which the mine plant force was too drunk to work the day after pay day and central-station power was bought to relieve this situation.

In this pioneering work a very ingenious selling agent proved most effective. An old box car was fitted up as a portable substation. This was sent around to different mines on trial and after use for a few days or a month proved to the mine owners that the power from the lines was reliable. Again, this substation was a fine entering wedge as an emergency source of power. Any mine in trouble because of its own plant's failure could telephone the power company for help and out would roll the portable substation to give emergency service. Needless to say, emergency service became permanent service in nearly every case.

The commercial drive for this mine load was very successful and until about 1920 more than 65 per cent of the revenue came from this business. Of the four big coal regions two are completely served by the utility and the other two are about 95 per cent served. A total of more than 70 large coal companies purchase all their power.

Other Developments Pushed

But the drive for the coal mine load was not the only job undertaken. Every possible load was gone after and the territory was extended as rapidly as loads appeared on the horizon. From time to time other towns and communities were taken over. In 1914, when the new Mullens coal field was opened, the utility rushed lines into the region and served the first and all the succeeding 45 mines now in operation in this field. In each town an active merchandising campaign was pushed except during a few years prior to 1924. When utility merchandising stopped, the increase in consumption in the towns decreased at an alarming rate, and after a three years' very disappointing trial merchandising was again inaugurated, with splendid results. Ranges to the number of 10 per cent of the customers are installed. Washing machines, vacuum cleaners, irons, toasters and percolators are found in good number, and today load building continues with refrigerators and waterheaters as added revenue producers.

TABLE I—MERCHANDISE SALES FOR 1925

There are ten stores and fifteen salesmen on the system, and they sold $150,000 worth of merchandise in 1925 and expect to sell $250,000 worth in 1926.

	Number		Number
Ranges	227	Water heaters	25
Electric washers	166	Curling irons	135
Vacuum cleaners	104	Heating pads	14
Flatirons	391	Kitchen lighting units	754
Mangle irons	33	Hair driers	2
Sewing machines and motors	21	Refrigerators	90
Fans	184	Electric signs	24
Grills and hot plates	70	Restaurant griddle	8
Toasters	37	Dish washer	1
Heaters	72	Bake oven	1
Percolators	79	Churns	12
Waffle irons	48	Vibrators	6

Equivalent to the addition of 652,815 kw.-hr. per year.

For example, Grundy is a small town with 78 customers but has 48 ranges and 29 refrigerators at work. Table I shows the balance in merchandising efforts.

In 1915 the average monthy revenue for a residence lighting customer was $1.25 and in 1925 it was $2.56. This increase was obtained with no appreciable change in rates and excluding the ranges and refrigerators on the system. Ranges give a revenue of about $7.14 per month per customer at a 3.6-cent rate. The business of the utility as a whole has increased 25 per cent for the last eight years through intensive commercial efforts.

EARNINGS SCARCE FOR YEARS

The gross revenue in 1913 was less than half a million dollars. In 1918 it had increased to a million and a quarter and in 1922 to nearly three millions. From 1913 to 1918 it was a hard fight to pay even bond interest and the 1918 surplus after fixed charges was only $211. But revenues increased rapidly, conditions improved and earnings began to mount, and from 1921 to date the utility has been a financial success.

Needless to say, this property was considered more or less of an undesirable current asset from an earnings standpoint in the early stages and passed from hand to hand like a hot plate. The Byllesby interests dropped out in 1913 and Viele, Blackwell and Buck again had control until 1915, when the United Electric Securities became the dominating factor. In 1920 control passed to the Electric Securities Corporation, which retained control until this year, when the American Gas & Electric Company acquired the property. During the whole period of its existence the Appalachian Power Company never failed to pay its fixed charges and bond interest, but it had the unusual distinction, so to speak, of never paying a dividend on its common stock, which has now passed from the market.

Wise management of the property brought about a continued program of improvement and development just as rapidly as conditions warranted. Starting early, the inefficient local steam plants were discarded and a modern steam plant at Glen Lyn was built. Then in 1920 about 50 miles of 88,000-volt modern pole lines was replaced with an equivalent modern steel tower line each year. A general tuning up process was kept up continually, and today the property is in fine condition and has a big construction program under way.

FUTURE WITH AMERICAN GAS & ELECTRIC COMPANY

A 132,000-volt modern steel-tower line will be the major transmission structure of the future, with subsidary systems at 88,000 volts and 13,000 volts. On June 6 a two-circuit, 132,000-volt line from Glen Lyn to Roanoke was placed in service. Another 132,000-volt line is under construction from Glen Lyn to Switchback and on to Logan. Another 132,000-volt line is planned from Switchback to Saltville and thence to Kingsport, in Tennessee. These lines will link the Appalachian system with the Kentucky and Ohio properties on the west and the utilities in Carolina and Tennessee on the south to form one of the largest interconnected systems in this country.

A contemplated new water-power development of 80,000 kw. on New River and a 25,000-kw. addition to be made this year in the Glen Lyn steam plant will still further augment the generating capacity of the new Appalachian Electric Power Company in this territory.

The hard fight for existence is over and the future looks very bright for the former Appalachian Power Company. It has proved a successful property on the basis of business found and developed in its own territory. In addition it is located in the heart of a great coal and hydro region, which will make it of fundamental importance to future interconnection developments. But the great feat of this utility is the human triumph of the men with initiative and courage who fought for economic survival and conquered. This story is a sample of what makes popular the development of light and power systems by private enterprise.

High-Pressure Steam Boilers in Czechoslovakia

FOLLOWING the example of other countries, increasing attention is now being devoted to the construction and use of high-pressure steam boilers in Czechoslovakia. The Witkowitz Mining & Ironworks Company of Witkowitz has recently built a battery for a Mahrisch-Ostrau concern to work at a pressure of 40 atmospheres and at a temperature of 400 deg. C. and also one for its own collieries to work at 100 atmospheres and a temperature of 490 deg.-500 deg. C. The last-named boilers are arranged to be fired by coke-oven gas, but may later be adapted to use pulverized coal.

TABLE II—REPRESENTATIVE CONDITIONS ON THE APPALACHIAN ELECTRIC POWER COMPANY SYSTEM IN 1926

	Number of Customers	Connected Load, Kw.
Municipal contracts	47	275.2
Residential lighting	11,221	8,604.3
Commercial lighting	2,267	3,104.0
Electric ranges	1,235	7,414.8
Small power	504	3,234.2
Large power	137	86,630.0
Other utilities	18	11,560.0
Total	15,429	120,822.5

Annual load factor, per cent	45
Annual peak load, kw.	60,000
Output in 1925, kw.hr.	292,000,000

TABLE III—GROSS EARNINGS (ELECTRIC) AND KILOWATT-HOUR SALES FOR THE YEARS 1921, 1922, 1923, 1924, 1925 OF THE APPALACHIAN POWER COMPANY CLASSIFIED ACCORDING TO INDUSTRIES SERVED

Industry	1921 Kw.-Hr.	1922 Kw.-Hr.	1923 Kw.-Hr.	1924 Kw.-Hr.	1925 Kw.-Hr.
Coal mining	67,454,104	82,003,580	87,144,303	91,985,758	106,530,096
Chemical and carbide	27,697,398	46,183,832	65,547,672	65,641,413	69,425,244
Utilities, retail	7,570,318	8,326,227	9,636,768	11,184,154	12,306,852
Utilities, wholesale	19,466,172	30,074,671	35,233,883	27,222,914	47,865,633
Furniture factories	73,200	114,390	266,510	707,937	1,003,418
Rock quarries	47,160	.....	393,720	1,950,720	1,920,080
Miscellaneous	1,758,284	2,129,562	3,151,905	3,824,858	3,659,047
Total	124,066,636	168,832,262	201,374,761	202,517,754	242,710,370

Electric Annealing at Walworth Plant

Wrench Forgings Treated in Electric Furnace at a Saving of $3 per Ton—Oil-Fired Equipment Displaced—Heating Cycle Cut Down and Improved—Quality Gains

By J. L. FADEN* and J. D. McMANUS†

SINCE 1841, when the Walworth Company was founded by Messrs. Walworth and Nason, this organization has participated in many of the great innovations that have revolutionized modern industry. Due to the nature of the steel products which it manufactures, the company uses many and varied industrial heating processes, and one of the latest of these to be studied has been the annealing of Stillson wrench forgings. The equipment formerly used was two oil-fired furnaces. The forgings to be annealed were loaded into the furnaces in cylindrical pots approximately 20 in. inside diameter and 15 to 16 in. high. These pots were placed on a base and stacked either three or four high with a cover plate over the top (Fig. 1). Joints between the pots were sealed with fireclay. An annealing cycle (Fig. 3) of about a week was required and approximately 26 tons of product and 16 tons of pots, etc., were loaded into the furnace. The dimensions of each of the oil-fired furnaces were 22x18x9 ft.

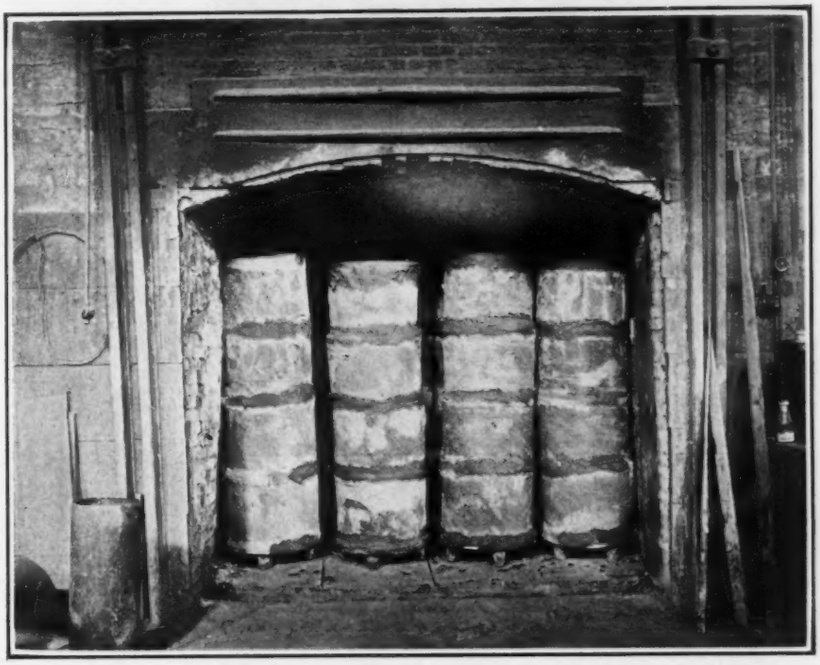


FIG. 1—STACKING MATERIAL IN OIL FURNACE LED TO UNEVEN HEATING AND MASS INVOLVED REQUIRED LONG HEAT CYCLE

Owing to the bulk of material treated at one time it was extremely difficult to obtain a uniform heat distribution in an oil furnace. Tests of temperature distribution showed a variation of at least 150 deg. F. even after the furnace had been in operation for a long time at 1,450 deg. F. During the process of heating up an average temperature difference of between 300 and 400 deg. with a maximum of 600 deg. existed between the top and bottom of the furnace. Tests showed that after the parts near the outside of the pot had come up to the temperature required, it took three and a half hours for the parts in the center of the pot to reach the same temperature.

SHORTENING THE ANNEALING CYCLE

A number of experiments were conducted with the idea of shortening the annealing cycle. Considerable study was also given to various heating cycles which it was thought would improve the quality of the anneal. It was determined that the only satisfactory solution of the problem was to treat the material in small masses so that practically the entire outside surface of each individual part would be exposed directly to the heat of the furnace. By this method it was found possible to secure a uniform anneal.

An annealing cycle was developed that gives a uniform fine grain structure in all of the parts, and also a very good machining quality. This cycle differs from the ordinary annealing cycle in that the material is heated to 1,450 deg. F., a temperature slightly above the upper critical point of the steel, and it is held here from five to ten minutes, then dropped during the next half hour to a temperature of 1,340 deg. F., which is approximately 40 deg. below the upper critical point. It is held at this temperature for two and a half hours and is then cooled in the furnace to a temperature of 1,000 deg. in one hour, after which it is taken out of the furnace and allowed to cool at its natural rate in the atmosphere.

The purpose of the long holding period just below the upper critical point is to change the structure of the cementite in the steel from the form of layers to the form of globules. The cementite in the steel is very hard, and when it is in the form of small globules the material is much more easily machined.

ELECTRIC FURNACE SELECTED

After a careful study of various types of furnaces utilizing gas, oil and electric heat, the Walworth Company decided to install a 180-kw. electric furnace. This furnace is of the semi-continuous counterflow type. It is 29 ft. long, 12 ft. 2 in. wide and 5 ft. 6 in. high outside, and is so designed that two trains of cars may

*Industrial Heating Engineer Edison Electric Illuminating Company of Boston.
†Assistant Works Engineer Walworth Company, Boston, Mass.

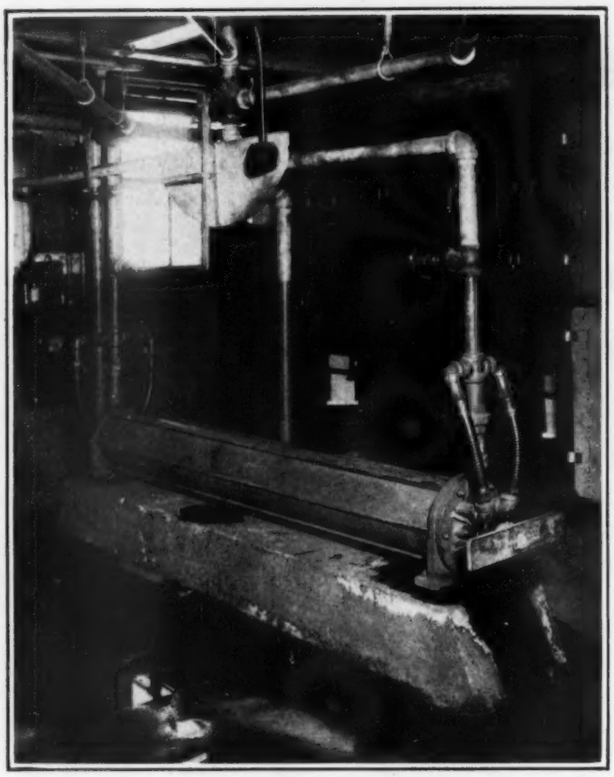


FIG. 2—HYDRAULIC PUSHER MOVES MATERIAL CARS THROUGH FURNACE

be moved in opposite directions through each half (see Fig. 4).

The furnace is divided into eight chambers. Starting at the charging end of one half of the furnace, the first chamber is used for preheating and is located directly opposite a cooling chamber for the opposite train of cars.

The second chamber is separated from the first by an intermediate charging door. This chamber contains one car, is operated at 1,450 deg. F. and is separated from the adjacent chamber and the opposite train of cars by an intermediate wall.

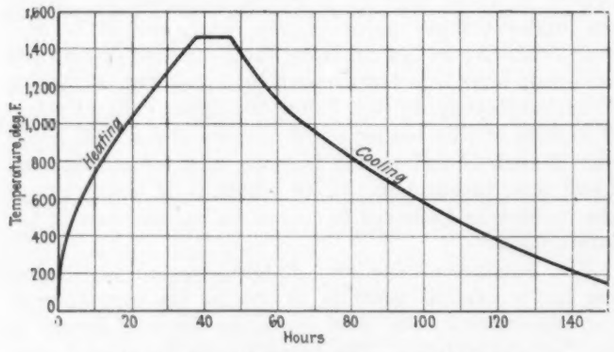


FIG. 3—OIL ANNEALING REQUIRED NEARLY ONE WEEK PER CHARGE

The third chamber is separated from the second by an intermediate charging door. It is divided into two zones separated by a curtain wall and containing three cars. In the first zone immediately after the heating chamber the temperature is dropped from 1,450 to 1,340 deg. F. The second zone, which contains two cars, is operated at 1,340 deg. F.

The fourth chamber is separated from the third chamber by an intermediate charging door and is used for cooling from 1,340 to 750 deg. F. This chamber contains one car and is opened to the preheating chamber on the other half of the furnace. The opposite sides of the furnace are arranged symmetrically but in a reverse direction.

The 1,450 deg. F. heating chambers are each controlled by a Leeds & Northrup recording type instrument. The zones of the 1,340 deg. F. chamber in which the temperature of the work is dropped from 1,450 to 1,340 deg. F. are each controlled by an instrument of the non-recording type. The zones operating at a constant temperature of 1,340 deg. F. are also each controlled by an instrument of the non-recording type.

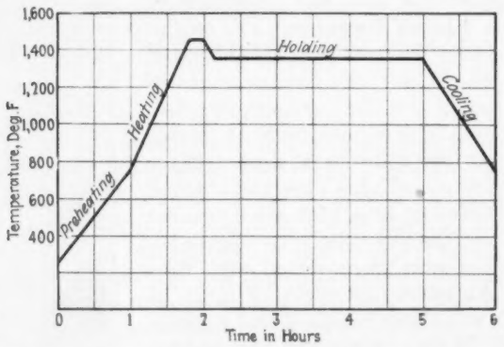


FIG. 5—ELECTRIC ANNEALING CYCLE TAKES SIX HOURS AS AGAINST 150 WITH OIL

As this furnace is designed for continuous operation, it is lined with high-grade refractory material and is well insulated. The side walls are backed up with 16 in. of Sil-O-Cel, and the arches over the chambers are insulated with 18 in. of the same material.

In order to keep down the leakage of the air into the furnace all seams on the outside steel shell have been welded, the doors carefully fitted and the cars equipped with sand seals.

The furnace heating elements consist of resistance ribbon designed for operation at 80 volts, three phase, 60 cycles. This voltage is secured from a bank of transformers reducing from a primary voltage of 6,900. The heating elements are placed on the roof of the furnace, which is the location best adapted to insure uniform heating of the type of load handled by this equipment. The instrument and control panels are arranged in a group and have standard equipment.

The operation of the furnace will be readily understood by following one car as it travels through the

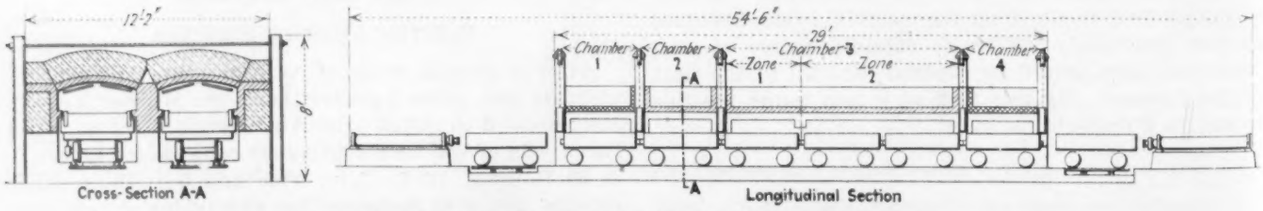


FIG. 4—CROSS-SECTION AND ELEVATION OF ELECTRIC FURNACE

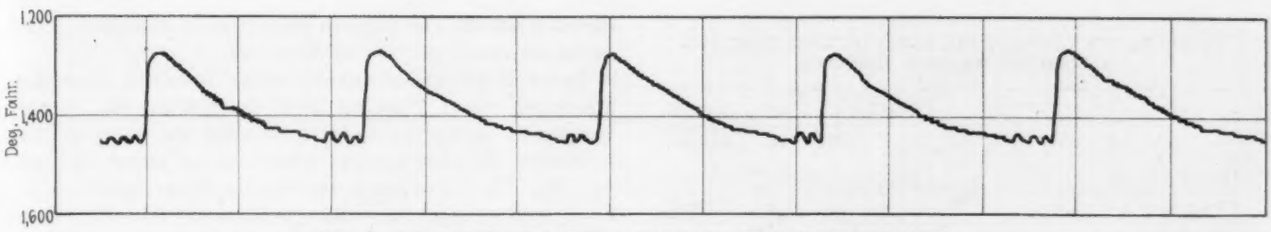


FIG. 6—TEMPERATURE CONTROL CHART OF HIGH-HEAT CHAMBER

furnace. A car when charged into the furnace is preheated from the car in the opposite half cooling from 1,340 deg. After one hour, the car is moved from the preheating to the 1,450 deg. or high-heat chamber. From this chamber it goes into the cooling zone of the 1,340 deg. chamber and is then moved into the holding chamber, from which, after two hours, it is moved into the cooling chamber. Cars in the opposite side of the furnace are moved at the same intervals but in the opposite direction.

The furnace described above was designed to meet the conditions of a loading capacity sufficient to anneal 12,000 lb. of wrench forgings per 24 hours and has electrical heating elements of sufficient capacity to anneal 18,000 lb. of forgings per 24 hours. The loading capacity is figured on the basis of 1,500 cu.in. per 100 lb. of forgings with flashings.

Based on continuous operation, annealing 12,000 lb. of wrench forgings every 24 hours, the kilowatt-hour consumption is 480 per ton.

The electric heating cycle is shown graphically in Fig. 5. Very uniform heat treatment is secured as a result of the method of loading the cars and the uniform temperature distribution in the chambers.

Operating Costs

The accompanying table gives comparative operating costs per ton between oil and electric heat in the annealing of the wrench forgings. The cost of oil in the tank fluctuated somewhat, but the average cost was 6½ cents a gallon. Before the oil could be burned, however, many miscellaneous costs were involved, such as pumping, atomizing, maintenance of the system and the handling of oil from the tank cars. A careful

FIG. 7—SHALLOW LAYERS OF MATERIAL FACILITATE QUICK AND ACCURATE ANNEALING

COMPARATIVE COSTS OF OIL AND ELECTRIC HEAT FOR ANNEALING WRENCH FORGINGS

	Cost per Ton Forgings Annealed	
	Oil	Electricity
Fuel:		
40 gal. at 6.5 cents	$2.60	.....
Pumping, atomizing and handling oil, 40 gal. at 2.5 cents	1.00	.....
480 kw.-hr. at 1.25 cents	.....	$6.00
Labor	4.17	1.93
Containers	.80	.....
Miscellaneous repairs	.40	.10
Additional machine tool expense	1.20	.....
Sand blasting	.40	.....
Interest on value of extra material carried in storage	.86	.....
Interest and depreciation on investment	.90	1.30
	$12.33	$9.33

analysis of these costs showed that they amounted to about 2½ cents a gallon, making the cost of the oil at the burners 9 cents per gallon.

The electric furnace was so designed that the labor of handling the material treated was reduced to a minimum. Per year, 5,775 man-hours is now required to take care of the work formerly requiring 12,500 man-hours.

In the electric furnace, due to elimination of the oil flame, the pots are not used, the material being carried directly on the car tops in the furnace chamber. This saves 80 cents per ton of forgings.

Subsequent operations formerly involved trimming, snagging, sand blasting and machining the wrench forgings. With the electric furnace the sand-blasting operation is unnecessary, which saves about 40 cents per ton. In the wrench machining department the average cost of machine tools was formerly $18,000 a year. As a result of electric annealing hard spots in the forgings were eliminated and a saving of about $1,800 a year was effected.

The annealing cycle using fuel oil took about seven days. This necessitated the carrying of a large amount of material in storage and process. The average value of this material was so reduced, owing to the short cycle secured with the electric furnace, that a saving of about 86 cents a ton was secured by a reduction in investment charges involved.

The analysis shows that a saving of $3 per ton is secured by using the electric furnace. This takes into account the larger investment charges involved in the use of electric equipment. The first cost of the electric furnace installation was about $20,000, compared with about $8,000 for oil furnaces.

Central-Station Operations 12.9 per Cent Over Last Year

THE amount of energy generated by the electric light and power systems of the country totaled 5,434,443,000 kw.-hr. during May, or 12.9 per cent over May of last year. This increase is slightly above the increase reported for the first quarter of the year, 12.5 per cent. The May output was 1.7 per cent below the estimated normal for that month, this normal being based on the operations for the past five years.

The gross revenue during May totaled $134,300,000 and the operating expenses $57,300,000. A detailed discussion of the financial operations of the industry will be found in the Financial and Corporate section in this issue of the ELECTRICAL WORLD.

The consumption of energy for industrial power purposes continues well above that of last year. Comparative consumptions of central-station energy for power purposes by years, however, are not all indicative of general business conditions, for the reason that during

TABLE I—GENERATION AND DISTRIBUTION OF CENTRAL-STATION ENERGY IN THE UNITED STATES
(100 per Cent of the Industry)

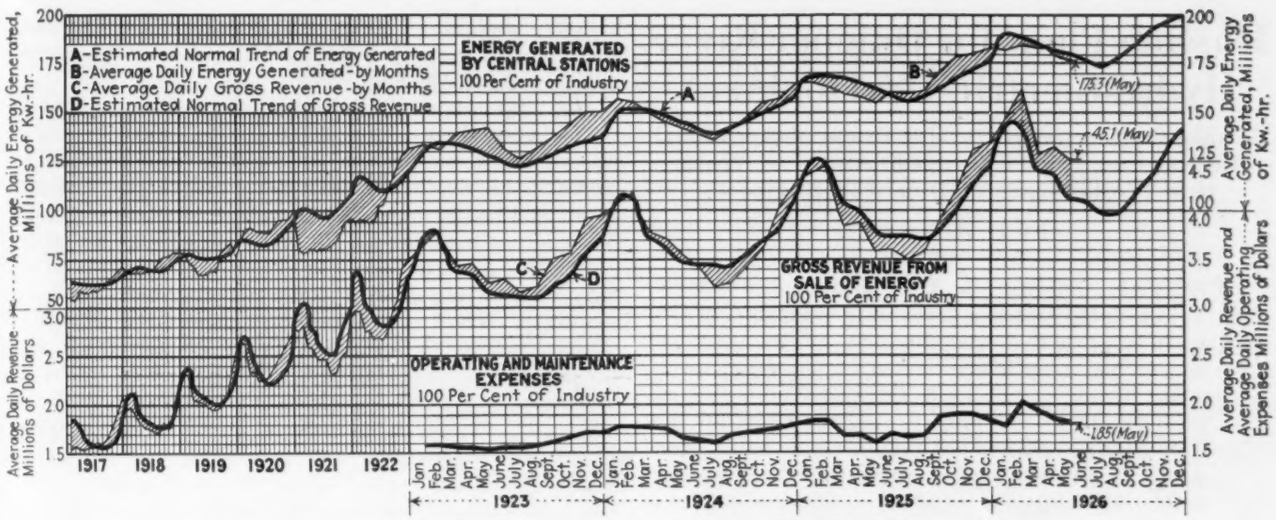
Month	Kw.-Hr. Generated Monthly *			Estimated Distribution of Energy Generated										Energy Purchased by Public Utilities for Resale, Kw.-Hr.	
				Total Energy Consumption by Central-Station Customers, Kw.-Hr.		Energy Consumed for Lighting, Kw.-Hr.		Energy Consumed for Power, Kw.-Hr.		Energy Sold to Electric Railways, Kw.-Hr.		Energy Used in Intracompany Business, Including Line Losses, Kw.-Hr.			
	1926 Thousands	1925 Thousands	Per Cent Inc.	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands
February	5,190,645	5,121,776	+11.2	4,188,645	3,729,235	1,128,000	1,044,000	2,559,645	2,201,235	501,000	484,000	1,002,000	892 000	980,000	680,000
March	5,727,028	4,963,857	15.4	4,621,028	4,008,857	1,212,000	1,123,000	2,854,028	2,346,857	555,000	536,000	1,106,000	958,000	1,090,000	735,000
April	5,391,188	4,777,289	12.7	4,348,188	3,854,289	1,152,000	1,067,000	2,654,188	2,253,289	542,000	534,000	1,043,000	923,000	1,070,000	720,000
May	5,434,443	4,812,665	12.9	4,385,443	3,883,665	1,164,000	1,089,000	2,661,443	2,255,665	560,000	539,000	1 049 000	929,000	1,119,000	744,000

* Data on "energy generated" are those collected and published by the United States Geological Survey for all public utilities minus such data as are collected on energy generated by electric railway companies, reclamation service and manufacturing plants. The data are, therefore, for the electric light and power industry only.

TABLE II—CENTRAL-STATION FINANCIAL OPERATIONS FOR FOUR MONTHS IN THE UNITED STATES
(100 per Cent of the Industry)

Month	Total Gross Revenue from Sale of Energy†			Estimated Distribution of Gross Revenue								Total Operating and Maintenance Expenses‡	
				Lighting Customers		Power Customers		Electric Railways		Other Public Utilities			
	1926 Thousands	1925 Thousands	Per Cent Inc.	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands
February	$145,000	$128,700	$13.0	$93,600	$86,100	$37,000	$31,600	$4,800	$4,500	$9,600	$6,600	$57,000	$52,000
March	142,000	125,000	13.5	90,500	86,000	37,100	27,500	4,800	4,200	9,600	7,300	58,500	53,000
April	141,000	122,000	15.5	90,500	80,000	36,100	29,400	5,000	4,600	9,400	8,000	57,600	52,100
May	134,300	119,000	12.9	86,100	78,600	34,300	28,200	4,900	4,500	9,000	8,000	57,300	52,200

† Aggregate gross revenue from actual consumers, and sales to other public utilities for resale, involving a certain amount of duplication.
‡ Do not include interest, taxes, depreciation or sinking fund.


A-Estimated Normal Trend of Energy Generated
B-Average Daily Energy Generated-by Months
C-Average Daily Gross Revenue-by Months
D-Estimated Normal Trend of Gross Revenue
ENERGY GENERATED BY CENTRAL STATIONS
100 Per Cent of Industry
GROSS REVENUE FROM SALE OF ENERGY
100 Per Cent of Industry
OPERATING AND MAINTENANCE EXPENSES
100 Per Cent of Industry
Average Daily Energy Generated, Millions of Kw.-hr.
Average Daily Revenue - Millions of Dollars
Average Daily Revenue and Average Daily Operating Expenses Millions of Dollars
Average Daily Energy Generated, Millions of Kw.-hr.
175.3 (May)
145.1 (May)
1.85 (May)
1917 1918 1919 1920 1921 1922
1923 1924 1925 1926

THE GROSS REVENUE DURING MAY WAS 4.1 PER CENT ABOVE THE ESTIMATED NORMAL

the twelve-month period a large number of new power customers are added to the central-station lines.

The reports indicate that considerably more energy is being generated in hydro-electric plants this year than last. In April the energy generated in hydro-electric plants totaled 2,277,143,000 kw.-hr., an increase of 14.6 per cent over last year, and in May a total of 2,267,001,000 kw.-hr. was generated in this type of plant, an average increase of 17.9 per cent over last year. There has been a noticeable increase in the amount of gas consumed in central-station plants. In April the amount of gas used was 2.9 per cent over that in 1925 and in May the consumption of this type of fuel was 8.1 per cent over the figure reached in May of last year.

A decrease is indicated in the operating ratio or ratio between operating expenses and revenue under that reported for May of last year. The operating ratio in May for companies having steam plants only was 48.8 per cent, as against 49.7 per cent in May of last year, and in hydro plants the ratio was 30.8 per cent, as against 33.1 per cent in May of last year.

TABLE III—OPERATING RATIO OF CENTRAL-STATION COMPANIES

Month	Operating Ratio					
	Steam Plants		Hydro Plants		Combined Hydro and Steam Plants	
	1926	1925	1926	1925	1926	1925
February	41.3	43.4	34.1	28.9	39.8	40.5
March	42.0	44.0	30.0	29.0	40.0	40.5
April	44.9	47.2	32.4	29.7	41.8	41.9
May	48.8	49.7	30.8	33.1	41.7	38.5

Southern California Edison Company Lists Hundred Thousand

MORE than 100,000 stockholders had been secured by the Southern California Edison Company on the opening of business June 19. This gives President John B. Miller's company the largest number of stockholders of any single electric light and power company in the world. Ivan McWhinney, a lad of eight years, residing at 36 Eighth Street, Hermosa Beach, acquired the distinction of being the one hundred thousandth stockholder.

The Southern California Edison Company now has two and one-half times more stockholders than the average of electric public utility corporations in the United States in proportion to the population served, based on the last reports of the National Electric Light Association. The company now has one stockholder to every five families in the community of 2,250,000 people served. Of its stockholders 90 per cent of them reside within its service territory and are consumers of its electric product.

Compared with national organizations the stock of which is very widely distributed, the company now ranks in number of stockholders with the United States Steel Corporation and the Pennsylvania Railroad Company, and as compared with all corporations in the country, it probably now ranks fifth in total number of participants in ownership.

The par value of preferred and common stocks owned by the company's 100,000 stockholders exceeds $105,000,000, or an average of but approximately $1,000 to each stockholder.

TABLE IV—OPERATIONS OF CENTRAL-STATION HYDRO AND FUEL PLANTS IN THE UNITED STATES*
(100 per Cent of the Industry)

Month	Energy Generated						Fuel Consumption								
	Hydro Plants			Fuel Power Plants			Coal			Oil			Gas		
	1926 Thousands of Kw.-Hr.	1925 Thousands of Kw.-Hr.	Per Cent Increase	1926 Thousands of Kw.-Hr.	1925 Thousands of Kw.-Hr.	Per Cent Increase	1926 Short Tons	1925 Short Tons	Per Cent Increase	1926 Barrels	1925 Barrels	Per Cent Increase	1926 Thousands of Cubic Feet	1925 Thousands of Cubic Feet	Per Cent Increase
February	1,886,471	1,725,877	9.3	3,304,174	2,895,358	14.1	2,886,534	2,741,313	5.3	683,580	959,595	—28.8	3,328,365	2,457,463	35.0
March	2,237,457	2,009,222	11.4	3,489,571	2,954,635	18.1	3,059,480	2,754,265	11.1	669,910	791,496	—15.3	3,899,085	3,214,656	21.2
April	2,277,143	1,988,621	14.6	3,114,045	2,788,668	11.7	2,743,412	2,587,289	6.4	610,217	658,080	— 7.0	3,465,746	3,367,663	2.9
May	2,267,001	1,922,231	17.9	3,167,442	2,820,434	12.3	2,713,522	2,579,798	5.2	599,419	639,763	— 6.4	3,720,823	3,434,604	8.1

* As collected by United States Geological Survey. The data are for the electric light and power industry only.

Russian Plans for Dnieper River Hydro-Electric Development

German Conception of Ukraine Project—Additional Information, from a European Angle, on Work Now in the Hands of American Engineers

BY L. H. BAUER
Berlin, Germany

AMERICAN interest in the large hydro-electric project on the Dnieper River in the Ukraine, which is now in very active consideration by the Russian Government, has been lately stirred by news announcements that Hugh L. Cooper & Company have entered into a contract for preliminary investigation of the project. The Russians for some time have been attempting to secure German interest and capital for this development, and the German conception of the project is here given exposition.

The territory surrounding the Dnieper River comprises about 193,000 square miles—that is, more than the total area of Germany. The length affected by dammed water (in the rocky part of the river's course) is about 56 miles, and the total inclination of the river in this district amounts to 112 ft., which it is intended to concentrate at one point. In order to obtain sufficient depth for river transportation at Ekaterinoslav the present level of the water will be raised by 10 ft., so that at the dam the total height of pressure at disposal will be 122 ft. It is planned to erect the dam at Alexandrovsk, about 190 miles from the mouth of the river in the Black Sea. The difference between water levels for shipping will be overcome by a system of locks.

The hydro-electric works will be built in the first instance for a capacity of 210,000 kw., capable of being increased to 450,000 kw.; when the level of the water is very high, it will be possible to raise the energy up to 800,000 kw. The water supply is quite ample for the first 210,000 kw., but in the case of droughts a steam-power reserve for the production of the maximum capacity will be necessary.

CONSTRUCTION PLANS

The dam near Alexandrovsk is planned with a length of 2,362 ft.; the sluices will be of such dimensions that ice and inundations in spring will cause no difficulty. The width of each wall bay will be 79 ft. and the height 28 ft. The hydro-electric power works will be connected with the dam in an angle of 45 deg. and contain in the first installation six turbines of 50,000 hp. each. It is planned to lead the buses from the plant along a gallery on the top of the dam to both shore ends, where substations for the distribution of current to the consumers will be erected.

On the left bank there will be a four-chamber lock with a capacity of between 6,000,000 and 25,000,000 tons. At the upper as well as at the lower head of the lock an auxiliary harbor will be erected for ships waiting to pass through the lock. All the buildings will be erected on a foundation of granite. At the place where the dam will be built the river bed is parted into three branches by two granite islands.

The electric current obtained by the erection of the Dnieper power works in their initial extent will be conducted to Ekaterinoslav, Kriwoj Rog, Nikopol and Alexandrovsk. The chief consumers will be the metal industry and municipality of Ekaterinoslav, the iron ore mines of Kriwoj Rog and Nikopol and the industrial plants of Alexandrovsk.

The total cost of the initial buildings is estimated at 138,000,000 rubles (at par $70,000,000). Besides extension of the works in the future it is also planned to increase the depth of the lower part of the Dnieper River by 15 or 20 ft. so that it will be possible for large ships to reach as far as Alexandrosk, about 190 miles. For this purpose the erection of two further dams 23 ft. high near Nikopol with corresponding locks will be necessary. The two hydro-electric power works with a capacity of 50,000 kw. each to be erected there can advantageously be connected with the power works at Alexandrovsk. The sea harbor at Cherson will be extended. The trans-shipment of cereals at Alexandrovsk will be effected in the future by means of elevators so that the ships need not pass through the locks. The same procedure will be followed with the shipments of naphtha, which will be pumped from one ship into another.

The Pripjatj, an auxiliary of the Dnieper River that connects the latter with the Niemen and the Vistula, will be put into condition fit for shipping and in this way the waterway from Germany to the Black Sea will be shortened considerably.

The planned extension of the Dnieper River will be of the greatest importance for the future development of the southern mining district. It will also be the seat of the iron and machine-building industry, as the south supplied in former times about 70 per cent of the total Russian iron production. The cheap current of the power works at Alexandrovsk will also permit the erection of aluminum works, for which considerable quantities of raw materials are available in the neighborhood. A number of other works, particularly for the production of chemicals, are also under consideration.

The price of current at the buses of the power plants will amount to 0.4 kopek per kilowatt-hour, whereas the price at the substations will be on the average 0.2 kopek per 62 miles higher for each kilowatt-hour.

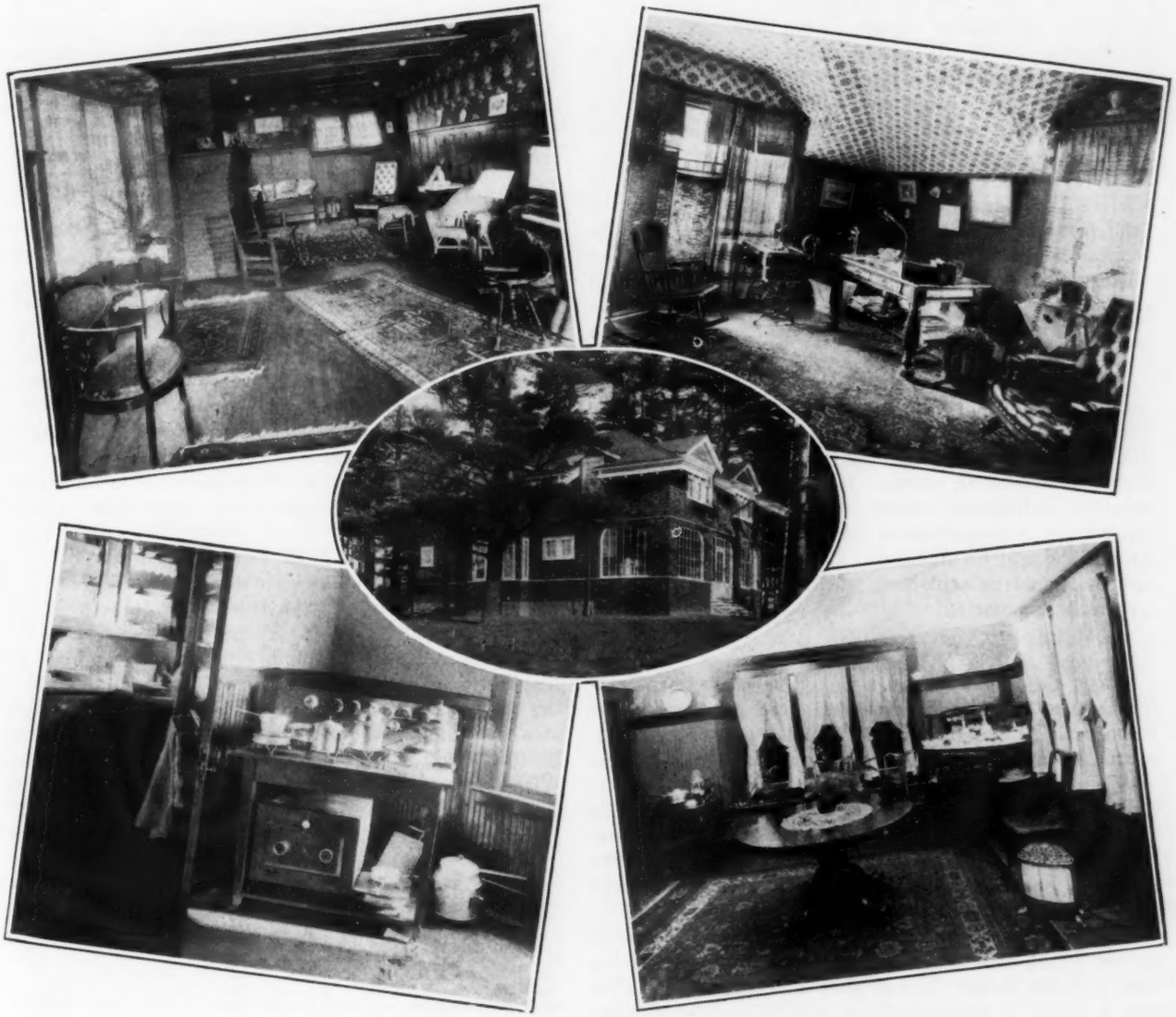
It is estimated that about six years will be required for the construction of the project, but it is hoped that this time can be reduced to five years if the necessary building material and equipment can be procured from abroad.

EDITOR'S NOTE—Under the title "Utilizing Russian River Power Electrically," the ELECTRICAL WORLD of Aug. 25, 1900, published the following item: "The Russian Finance Minister is at present engaged in studying plans for the employment of the falls in the Dnieper River for producing electric power, says the Chicago *News*. The plans have been worked out by a corps of Russian army engineers, and with these a company has been formed by capitalists, who have set apart 6,000,000 rubles ($3,000,000) for the purpose of developing the plans as soon as the concession is granted by the government. The company proposes to make the Dnieper navigable from Ekaterinoslav to Alexandrovsk and transmit the power from the falls to the former city, where, of late, numerous factories, mills and mines have been opened. Some years ago an English company had been formed for the same purpose, but, owing to a severe press campaign against it, it was unable to obtain the concession. The Ekaterinoslav district is one chiefly of coal and ore mines, most of which are in the hands of the Belgians. It is stated that the Belgians have not less than from $360,500,000 to $412,000,000 interested in this one district. So important are the interests of Belgium in the district of Ekaterinoslav that not long ago the Belgian Consulate-General at Odessa was transferred there. In southern Russia this entire district goes under the name of New Belgium."

Electricity in the Home

Twenty Years' Survey by the Inventor of the House Without a Chimney—What the Electric Oil Heater Means to Home Owners and Central Stations—Data on Costs and Servicing

By H. W. HILLMAN



ALL-ELECTRIC HOME AND SOME OF ITS ROOMS

IN A recent article by the late C. A. Coffin, founder of the General Electric Company, dealing with the future of electricity in the home, he stated: "In due course electric appliances were developed for domestic purposes, and the pendulum has swung back until the entire central-station industry is bending its energies to develop the domestic load." Also in a recent article in the ELECTRICAL WORLD Charles J. Russell, vice-president of the Philadelphia Electric Company, stated: "It is believed in Philadelphia that the residence field offers the greatest opportunity for development presented by any existing class of business."

Twenty years ago the "house without a chimney" was built by me at Schenectady, N. Y. For various reasons it attracted widespread attention. The wiring specifications represented a radical departure from the usual run of specifications for house wiring of that period. It was a new idea to specify outlets in baseboards and side walls so that electric household utensils might be freely used without removing lamps from their sockets. There was also a circuit heavy enough for a cooking and baking outfit, but the contractor bidding on the job looked with serious concern upon that part of the specifications that called for a complete house-heating circuit.

However, electric heaters were installed in all of the

rooms to the extent of 15 hp. of connected load. Three recording wattmeters, a curve-drawing wattmeter and a recording thermometer furnished charts and records during the winter's test that were interesting and instructive.

The Society for Electrical Development, represented by Robert Crouse, was keenly interested at that time, as it is today, in obtaining new ideas about the use of electricity in the home. On a trip East Mr. Crouse stopped off at Schenectady to inspect the house without a chimney. Having secured from me data and photographs, the New York *Herald* printed a full-page story in one of its Sunday issues. This idea was adopted by newspapers in all of the large cities and towns throughout the United States. The editors of London, Paris and Berlin newspapers immediately wrote to me for photographs and a story, which likewise appeared in full-page form in their Sunday issues.

The use of electricity in the home seemed greatly to interest the magazine editors also, and the editor of *Good Housekeeping* came to Schenectady to inspect the peculiar house. Before long the various magazines had stories and photographs relating to electric household utensils.

Then central-station managers from various parts of the country began to take an active interest in electric heating matters, evidently becoming aware of the keen interest the public was taking. Of course they were desirous of having all the information available. But this information could not be secured from devices shown in exhibition rooms. It was before the days of beautiful exhibition rooms. Generally speaking, central-station representatives had not used electricity in the home except for lighting. Just exactly what heating devices should be exploited, and how, formed a subject for much speculation.

INSULL RECOMMENDS STUDY

About this time I read a paper on "Electric Heating Devices" before the Association of Edison Electric Illuminating Companies at the Hotel Wentworth, Portsmouth, N. H. Samuel Insull was present at that meeting, and after listening to the reading of the paper, he made a motion that the president of the association should appoint a committee of six engineers to determine if what was stated in the paper represented the truth; if so, he declared that electric heating should be vigorously pushed by the member companies.

The heating committee was appointed, and as a result of its exhaustive investigation, it was recommended that lighting socket devices should be exploited. This was a signal to manufacturers and to central stations that a definite, clean-cut policy had been established. Electricity in the home was to be the watchword. Industrial heating, house heating, electric cooking and baking and many other special forms of heating were to be set aside, and the combined efforts of manufacturers, central stations, supply houses and contractors were to be focused on lighting socket devices for increasing the use of electricity in the home.

Today there are 10,000,000 electric irons in use, 3,000,000 washing machines, very nearly 5,000,000 vacuum cleaners, 3,000,000 toasters and nearly half a million electric ranges. A survey for 1926 indicates that approximately 200,000 electric refrigerator units will have been installed by the end of this year.

One cannot help but marvel at the extent of progress which these figures represent. My mind naturally reverts back to the early days when difficulties and troubles seemed to make progress woefully slow. Notwithstanding, the obstacles have been surmounted. With the extensive study and intensive cultivation of electric refrigerators and ranges, the well-worn statement will become obsolete that capital investment in electric light and power companies is idle more than half the time. On the contrary, central stations will have to their additional credit the building up of a domestic annual load factor of approximately 30 per cent.

Within the next few years there will be practically 20,000,000 wired homes, representing the potential field for these electric household utensils. Hundreds of millions of dollars will be added to central-station revenue should but a small percentage of residence customers install these popular devices.

SOLUTION OF THE COAL AND ASH PROBLEM

But as I started more than twenty years ago to live in a home atmosphere surrounded by convenience, comfort and cleanliness furnished by electrical devices, it has been a source of deep regret that it was necessary to heat my home by the use of coal. This has caused dirt and dust both from coal and ashes, with time, trouble and annoyance, as well as ever-increasing expense. During these same years the cost of electricity in the home has continually been decreasing. Coal heat increasing; electricity decreasing. Coal operation inconvenient, uncomfortable, dirty, dusty and uncleanly; electricity convenient, confortable, cleanly and automatic.

Late in the fall of 1925 I installed in my house at Forest Hills, L. I., an electric oil heater. In fact, it is very much electric! When the installation was made, the wiring contractor's labor and material expense was almost as much as the plumber's work for piping and installation of tank and burner. A ⅛-hp. motor operates the blower, whereas a much smaller electric motor operates the pump that pumps the oil from a 550-gal. tank in the yard to the burner in front of the furnace. With BX cable, switches, switch and fuse box, electric clock, electric pressurestat, electric thermostat and electric Thermoid circuit breaker, there was so much electric that it occurred to me at once that it was "an electric oil burner."

COMPARISON OF OPERATING COSTS

1924–25		1925–26	
Sept. 21 to Oct. 21	$3.10		
Oct. 21 to Nov. 19	3.11		
Nov. 19 to Dec. 19	3.89		
Dec. 19 to Jan. 21	4.89	Dec. 18 to Jan. 18	$8.14
Jan. 21 to Feb. 20	3.66	Jan. 18 to Feb. 18	8.15
Feb. 20 to March 26	3.67	Feb. 18 to March 25	7.74
March 26 to April 21	2.61	March 25 to April 25	4.27
April 21 to March 24	2.70	April 25 to May 25	4.10

For the first time in years I was free from shoveling coal and taking out ashes. An automatic heating system operated by electricity was actually in my house. Another electric household utensil, and the very best of all, because this time it saves father as well as mother. Convenience and cleanliness are beautifully demonstrated in this new electric household utensil. Electricity in the home was again shown to be a winner.

The electric oil heater produces a low-pressure flame, hence there has never been any smell, smudge, odor or smoke either in the house or the cellar. It is not

noisy and has not required any service from plumber or electrician to keep it operating during the winter.

Here I quote again from C. A. Coffin's article: "It is obvious that increased use for electricity must be sought without materially increasing central-station investment." With the installation of this electric oil heater only 100 watts is connected to the load, yet in the month of January the load factor was 60 per cent, and the annual load factor will run 25 per cent.

The regular heating season in Long Island climate will run fully seven months, although as late as June 9 of this particularly cool summer the electric oil heater was turned on for a short time in the morning. This idea grows in a home. The turning of a switch has always been made easy. The electricity has always been available. The first favorable impression from my house without a chimney at Schenectady twenty years ago was the ease with which the electric switch could be turned and would bring convenience; next was the small cost involved.

CONVENIENCE OF OIL-ELECTRIC HEATING

So on June 9, almost the middle of the summer, electricity was used in the home for heating; the thermometer was brought up to 70 deg.; the chill was taken off from the rooms. The total cost was less than 3½ cents.

It does not take much thought to understand this situation. Coal would not be used on June 9 (easily) because it is such a job, so inconvenient to chop wood and build a fire. It takes too much time and is a burden. But with oil in the tank and simply a turn of the electric thermostat, the heat is there available, and automatically off again at 70 by the thermometer.

The accompanying table shows my electric light bills for the fall, winter and spring of 1924-1925, and opposite are the figures for electric light plus the electric oil heater for winter and spring of 1925-1926.

The additional income to the electric light and power company for the five months was $14.87. With the three fall months to be added, the total additional annual income to the electric light and power company will be $20, showing that 220 kw.-hr. is consumed by the electric oil burner and showing further an annual operation of at least 2,200 hours.

Thus with the installation of the electric oil heater there is increased use for electricity without materially increasing central-station investment, which is the ideal load.

During the six months from December, 1925, to June 1, 1926, I used 2,100 gal. of furnace oil at 9½ cents per gallon, or a cost of $200. Due to strike conditions under which the coal firms were operating, my coal for the same period would have cost me $250. This coming season of 1926-27 I expect to use 2,000 gal. of oil at 10½ cents per gallon, an increased cost of 1 cent per gallon, or a total of $210. At the prevailing price of coal for this coming season, with the expense of monthly care, the operating cost for heating my house would have been about the same as the new automatic electric oil heating system. But when the tank wagon drives up the street to leave oil, the house is not filled with dust; ashes are not being continually taken out and up the cellarway to the street. For cleanliness and convenience and health there is no comparison between the two systems.

As soon as these advantages to both the central station and the home become known the electric oil heater will be a necessity in every home. The engineers and manufacturers are now beginning to do their part in providing safe, practical and efficient apparatus for supplying heat electrically. The future of the electric oil heater is therefore in the hands of the electrical industry; the contractors and dealers, because of the wiring and supplies; the manufacturers and central stations, because of the large revenue to be obtained.

The very high prices for oil heaters in the past have tended to make their sales slow, but it must be remembered that a short time prior to my house without a chimney flatirons sold for $15 each, and in one city not far from Schenectady the total sale for the entire year was seven irons. The business was mightily stimulated when quantity production brought down costs; and quantity production came after the central stations adopted the policy of vigorously pushing the use of electric household utensils in the home.

It took six years to extend the sale of electric refrigerator units from 3,000 to 142,000, yet the estimated quota for this year of 1926 is set at 200,000.

In my judgment the electric oil heater is one of the most important contributions that the electrical industry can make to the home. The industry has materially improved the living conditions of the public by the wonderful success of electric household utensils, and the furnishing of heat by electricity and oil lends another opportunity to cement more closely the close pleasant relations between the electrical industry and the home.

New Tandem Rolling Mill Control

Problem of Speed Differences Between Rolls to Care for Elongation of Material Solved—Tandem to Independent Motor Control Easily Accomplished

BY P. B. HARWOOD
Cutler-Hammer Manufacturing Company

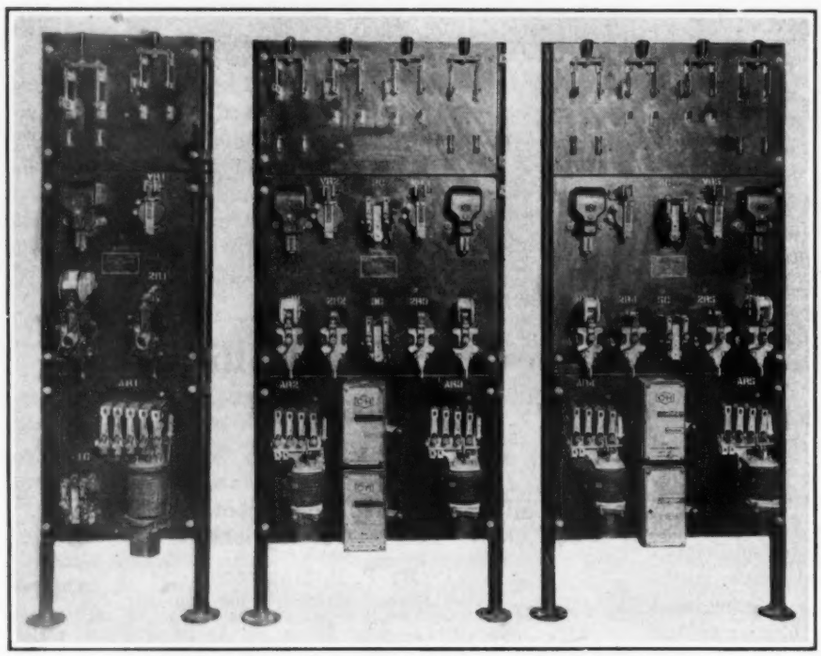
THE use of tandem drive on large rolling mills, particularly on cold strip mills, is not new, but the application of tandem drive to small mills rolling nut stock is. The present process of rolling nut stock is somewhat similar to a wire-drawing process in that it is necessary to roll the stock through one set of rolls, then wind it on a reel and roll it through another set of rolls. This is continued until the stock is brought down to the required section, it being necessary to wind it after each rolling operation. With the tandem drive much handling of material is eliminated, as the stock passes through one roll after the other without having to be rewound.

The stock rolled is rectangular in section. After passing through the five mills it comes out as square stock in some cases. With square stock the nut blanks are sheared off so that the thickness of the blank is the thickness of the nut. In other cases after passing through the five mills the stock comes out rectangular and not square, and then the nut blanks that are sheared off determine the width of the nuts. The first mill is a flattening mill having horizontal rolls, the second an edging mill having vertical rolls. The third mill

is a flattening mill, the fourth an edging mill and the fifth a flattening mill. From the fifth mill the stock goes on to an electrically driven reel, which is controlled in tandem with the five rolling mill drives.

The motors used are Reliance Electric Company's compound type having a three to one speed range by field control. A main contactor is provided and a final accelerating contactor. The intermediate steps of acceleration are handled on a timing device which handles the main motor circuit.

On the double motor panels transfer switches are mounted which are marked "normal" and "tandem." If one of these transfer switches is in the normal position, the motor which it controls operates independently. If, however, the transfer switch is thrown to the tandem position, then the motor which it controls is connected in tandem with the motor ahead of it. It is possible to operate any motors in tandem provided they are on adjacent rolls and at the same time operate independently any of the other motors not so connected.



FIVE-MOTOR TANDEM ROLLING MILL CONTROLLER

The illustration shows the control panels for each motor consists of a main line for the five rolling mill motors. It does knife switch with fuses for the control not include the panel for the winding ma- circuit, a double-pole, double-throw knife chine. The first panel at the left is the switch used for reversing the motors by controller for the 30-hp. motor. Each of means of reversing the shunt field in the two other panels mounts control equip- emergency, and the necessary contactors ment for two 15-hp. motors. The controller for accelerating and controlling the motor.

It is also possible to operate motors which are not adjacent in tandem, but in this case it is not possible to operate the intermediate motors independently.

When a motor is operating independently, it is controlled from its own station. When motors are in tandem, the control stations of those motors are also connected together, so that pressing any stop button will stop all of the drives and pressing any of the inch buttons will inch all of the drives. A run button, however, starts only its own motor. If an overload should occur or a fuse blow under tandem operation, all the equipments in tandem would be shut down.

One of the problems of this installation was to obtain the proper speed difference between the rolls to take care of the elongation in the material as it passed from one roll to the other. Three methods of doing this were provided, one being a main rheostat to adjust the motor speed, another being a vernier rheostat provided for very fine speed adjustment, and the third scheme being an arrangement for adjusting the compound winding of the motor.

This equipment has been installed and operating about six months and has been very successful.

Letters from Our Readers

Allocating Capacity Costs

To the Editor of the ELECTRICAL WORLD:

Under the above title W. J. Greene in the ELECTRICAL WORLD of May 29 more fully explains the method of allocating capacity costs which he outlined in a previous issue. He recommends the use of two plans the results of which are exactly the same, so that in commenting upon his suggestions it is not necessary to distinguish between these two plans. The special feature which characterizes both plans is the same, viz., varying the amount charged against any customer—or, I assume, classes of customers—more or less in proportion to the load factor of the customer's business. This plan, he believes, results in the allocation of more accurate costs than are allocated under the demand method recommended in my article of March 6. Under the latter method, as is well known, the question of load factor is disregarded and the amount allocated is dependent upon the maximum demand required. Under Mr. Greene's method a customer having a load factor the same as the average load factor is charged exactly the same price per kilowatt as under the demand method, and customers with load factors higher than the average pay more, while customers with load factors lower than the average pay less than under the demand method.

Close study of Mr. Greene's method shows that it has been very carefully worked out, and if his theories were unassailable, it would perhaps be a very great improvement over the demand method. Under his plan, if the diversity factor is unity, the charge per kilowatt is the same for all customers regardless of their load factors. As the diversity, and consequently the system load factor, increases the capacity cost differs to a greater and greater amount for different customers' load factors until finally, when the combination of the average customers' load factor and diversity factor results in a 100 per cent system load factor, the charge per kilowatt becomes directly proportional to a customer's load factor. This means that Mr. Greene's method agrees with the demand method if the diversity factor is unity, and that with a station load factor of

100 per cent his method agrees with the consumption method, where the charge is in direct proportion to the kilowatt-hours.

In discussing this subject it is well to keep clearly in mind the distinction between rates and costs and also that costs may be subdivided either into increment costs or allocated costs. Mr. Greene's article of May 29 appears to assume that rates are based upon allocated costs, and, while this assumption simplifies his examples, it is well to remember that this is not the way rates have been determined and that rates can be profitable in fact, even though they are below the allocated costs, provided they are above the actual increment costs. Allocated costs should not therefore be taken as conclusive; they are average costs and as such should be used merely as a test to see whether or not the revenue from each rate meets these average costs under the conditions existing within the different classes. If it does not in any particular class, it may be because the business taken under it is not yet in sufficient volume to reach average conditions and that tested by the increment cost method the rate would show an actual profit.

The idea of basing the demand charge of the rates upon the load factors of the different customers is not new and has been suggested to me many times. It is thoroughly consistent with the standpoint on which my article of March 6 was based, inasmuch as interest on the company's investment must be earned throughout the year and should be collected from all customers using it during the year, and not merely from those customers who happen to take service at peak time—regardless of the fact that, broadly speaking, the company's investment is determined by the demand at peak time.

My objection to this suggestion is that the rates under which a very large proportion of a company's income is derived must be designed to conform to isolated-plant costs, and it is obvous that private-plant investment is affected only to a very slight degree by the load factor at which the plant operates. If costs of high-load-factor business are increased by the use of Mr. Greene's method, so that a rate shows a deficit, we should either have to raise the rate, and thereby lose the business if the present rates correctly represent the true value of the service to the consumer, or admit the failure of the method of cost allocation to represent the facts correctly, if we are satisfied that the rate actually makes a profit above the increment costs.

The latter condition, as I have already intimated, may happen under any system of cost allocation, but the more we depart from the principles which affect private-plant costs and central-station costs as well, the less likely we are to obtain results which have any significance.

I believe, therefore, that the cost allocations of any given system are more accurately made by considering the size of the demands alone, rather than by using the modification suggested by Mr. Greene, inasmuch as we are thus spreading the capacity costs determined by the size of the company's investment over the demands of all customers in the same way that the customers would have to bear these costs if they were operating their own plants.

If diversity factors were inversely proportional to load factors, it might be argued that on this account we would allocate capacity costs more accurately under Mr. Greene's plan, inasmuch as the company's cost per kilowatt of customers' demands would decrease with decreasing load factor of customers. That is to say, if short-use business could be depended upon to spread itself evenly over the 8,760 hours of the year, the opportunity for greater diversity would be uniform and would justify taking this into consideration in allocating costs. The fact that a 100 per cent load-factor customer offers no opportunity for diversified use of the capacity required by him is self-evident, but this fact is far from justifying the conclusion that opportunity for high diversity therefore increases proportionately with decreased load factor. The fact is that low load factor *per se* offers no assurance of greater diversity, inasmuch as the demands may be so bunched that a class may call for a relatively high peak with small diversity as compared with another class.

If customers with load factors widely different from the average are added to the existing business of a given class, there is no doubt that alteration in the cost allocations will probably be required if the new business is of sufficient volume. Assuming rates to be based upon allocated costs under the demand method, Mr. Greene evidently fears that the companies will lose money on extremely high-load-factor business. This seems unlikely, because if the business is to be added to systems having ordinary load factors—say around 40 per cent—I would think that rates based upon the demand method of allocating the costs of such systems would be likely to be too high to meet the competitive costs of private plants with extremely high load factors, rather than so low as to involve a loss over the true increment costs.

Of course, this would depend largely upon the diversity factor of the class to which the business is to be added, but such business would be likely to come under the large wholesale classes, where the diversity factors are assumed to be low as compared with what Mr. Greene has used in the example he gives. If it came in a class designed for the smaller customers, where diversity factors are assumed to be high, it could be averaged in with the rest of the class without seriously affecting the results of the class until such time as it became of importance enough noticeably to affect the diversity factor of the class.

I question Mr. Greene's claim that the addition of high-load-factor business must necessarily cost more and low-load-factor business less than the average amount per kilowatt, inasmuch as I feel certain that there is no such definite and uniform relation between load factor and diversity factor as would be required in order to substantiate his claims.

For reasons stated herein, therefore, I feel obliged to disagree with Mr. Greene's claim that his method results in an "accurate" division of costs among customers. It seems to me it is merely an ingenious mathematical compromise between allocating capacity costs upon the demand method and upon the straight kilowatt-hour method, rather than a more accurate method of cost analysis such as would be required in order to warrant abandoning the demand method in allocating the capacity costs between all the rates of a company.

A. S. KNIGHT,
Consultant.
Boston, Mass.

Central Station and Industrial Practice

Operating Induction Regulators in Series-Parallel

BY E. H. COXE, JR.
Duquesne Light Company, Pittsburgh, Pa.

NO DOUBT most substation operating men have encountered the problem of making their substation equipment capacity keep up with distribution load growth where the latter has exceeded the predictions of the engineers who designed the distribution system. The substations department of the public service company with which the writer is associated has frequently had to increase the capacity of its 2,300-volt lighting feeders temporarily while plans for permanent relief were being made.

Circuit breakers and disconnect switches of the same voltage but a higher ampere rating than those already installed are but little if any larger in exterior dimensions, and no difficulty has been encountered in installing these. Induction regulators, however, present a different problem. Until recently the company had standardized on 46-kva. regulators and had in stock only these and some of 92-kva. capacity that had been purchased for emergency or temporary replacements. In many cases a 92-kva. regulator has been installed to relieve an overloaded 46-kva., but in some instances there has been insufficient clearance to permit the installation of the larger regulator, and in others it has been desirable to make use of a spare 46-kva. regulator that happened to be available in the station. It was in these latter cases that the series-parallel connection was used. Each regulator was connected for 400 amp. and 5 per cent boost or buck. The two regulators were then connected with their current or secondary coils in series and their potential or primary coils in parallel, thereby obtaining 400-amp. capacity and 10 per cent regulation. This connection is shown in Fig. 2. Some of the regulators of one manufacturer were designed for 200-amp. service only, but were successfully reconnected internally to give 400-amp. capacity.

By connecting the current coils of each regulator for 200 amp. and then connecting the coils of the two regulators in parallel 400-amp. capacity can be obtained. This, however, would cause a current to circulate between the two regulators, and undue heating, probably to the extent of damaging the regulators, would occur in case the two regulators did not boost or buck exactly the same amount. Due to variation in brake adjustments and motor speeds, it is practically impossible to obtain the latter condition of operation without mechanically coupling the motors. This is frequently impractical due to unsuitable physical arrangement, and in all cases would necessitate some shop work and special fittings. This method has therefore not been used.

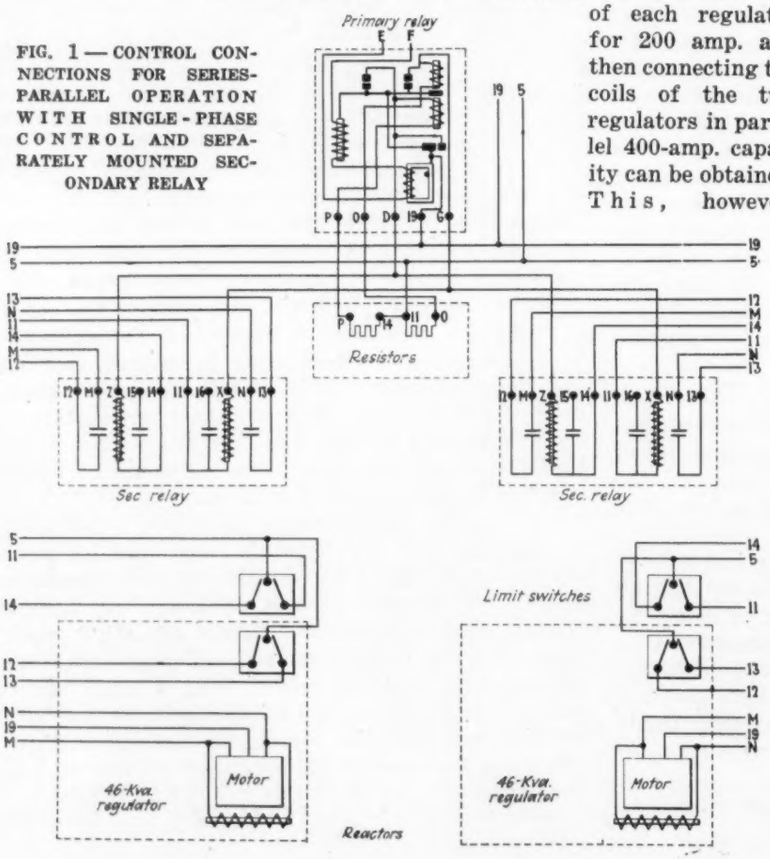


FIG. 1 — CONTROL CONNECTIONS FOR SERIES-PARALLEL OPERATION WITH SINGLE-PHASE CONTROL AND SEPARATELY MOUNTED SECONDARY RELAY

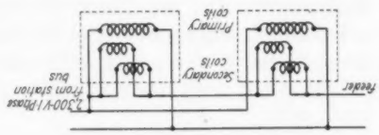


FIG. 2—REGULATOR CONNECTIONS FOR SERIES-PARALLEL OPERATION

In each case of series-parallel operation a single primary relay or contact-making voltmeter was used, while each regulator has its own secondary relay and limit switches. With the current coils of the regulators in series, differences in rotor position have no effect on line voltage and neither machine can become overloaded. Should the rotors become so displaced from one another that one regulator boosted while the other bucked, the proper line voltage would still be maintained, the only bad effect being unnecessary core and copper losses in them. It has been found, however, that the rotors become displaced but a few degrees per day, and they can be easily set together occasionally by hand.

Several difficulties were encountered in obtaining satisfactory relay operation with these regulators. In one case where two regulators having single-phase motors and separately mounted secondary relays were installed on a single-phase circuit it was found that when either regulator reached the cutout position, the secondary relay operating that regulator would not drop open and the regulator could not therefore again become automatic when movement in the opposite direction was demanded by voltage conditions. This proved quite puzzling for some time, but finally it was discovered

that the relay-operating coil was receiving energy through the motor of the regulator it operated and through the limit switch of the other regulator with which it was operating. This trouble was eliminated by installing double contact limit switches on all similar regulators operating-in series parallel. The connection used is shown in Fig. 1

Regulators having the combined secondary relay and limit switch and regulators having double-pole, knife-blade type limit switches operate satisfactorily with the primary relay operating the two secondary relays in parallel, no other changes being made.

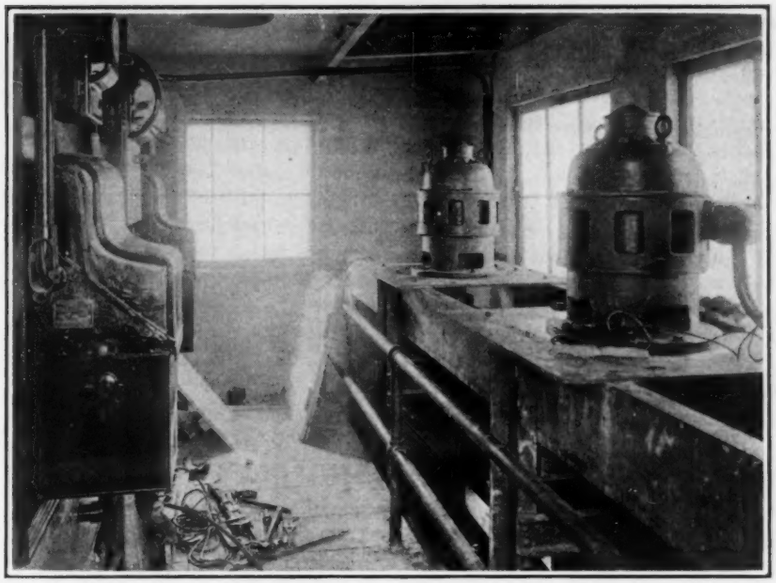
Automatic Pump Stations at Grade Crossings

AUTOMATIC pumping stations for the collection and disposal of storm water were recently installed jointly by the Detroit, Toledo & Ironton Railroad and Wayne County, Michigan, for operation at seven of ten highway grade-crossing separations just completed on the railroad's northern division. These stations were designed to solve the problem of adequate storm water drainage in view of the low level resulting from depressing the highway.

Concrete pump houses were erected containing electrically driven pumps operating from local power lines. Concrete sumps sunk about 15 ft. below the pavement collect the water from catch basins located at intervals along the line of the depressed highways, the water being diverted underground through vitrified tile drains. Other catch basins above the pump house floors but below railroad grade provide receptacles for the water as it is pumped from the wells and are sufficiently elevated to allow a gravity flow through vitrified pipe into drainage ditches under the tracks.

American Well Works pumps are used at six of the crossings, and all the pump houses are equipped with General Electric motor drive with automatic control. A typical installation consists of two 8-in. centrifugal pumps within the pump house which empty the 17,800-gal. sump. Each pump has a capacity of approximately 860 gal. a minute and is driven by a 10-hp. motor having a double squirrel-cage rotor.

Float switches in the wells control the pumping motors through magnetic switches. The pumps supplement each other, one or both being thrown into action as the level of the water rises. They are automatically thrown out of service as the water recedes in the sump. Maintenance costs are reported by the railroad to be comparatively small.



INTERIOR OF PUMP HOUSE, SHOWING MOTORS COUPLED TO PUMPS OVER THE SUMPS

Holding Down Expense of Installing Meters

CONTRACTORS in one Middle Western city have been sufficiently interested by the utility company in setting and connecting high-tension and large-capacity meters for installations they have wired that the utility seldom has to do this work for newly wired installations. The utility prescribes the location and method of setting the meters and delivers them to the contractors before they have completed their wiring jobs. The chief reason why the contractors accept this responsibility is that they want to show their clients a complete wiring job ready for electric service and not an installation with tag ends hanging here and there. Virtually all the contractors include this service in their bids.

Although the expense saved to the

GRADE CROSSING SHOWING LOCATION OF PUMP HOUSE

utility is small on domestic installations, it mounts into a considerable figure on many installations. On 4,000-volt industrial installations involving instrument transformers probably $15 per installation is saved, it is reported.

Partly as a result of this practice and also because the utility company's meter department utilizes its installers and testers interchangeably when a slack period occurs in either occupation the department was able to hold down the cost of installing, removing, resetting and changing all domestic, commercial and industrial meters to an average of 32.6 cents apiece between May, 1925, and June, 1926. The lowest unit cost was 24 cents and the maximum 46 cents. The lowest expense usually occurs when there is a large amount of work to share the overhead expense, and the maximum expense when there is less work because men are retained during slack periods.

These costs include all transportation, labor, record keeping, local and overhead expense.

A Modern Load Dispatcher's Board

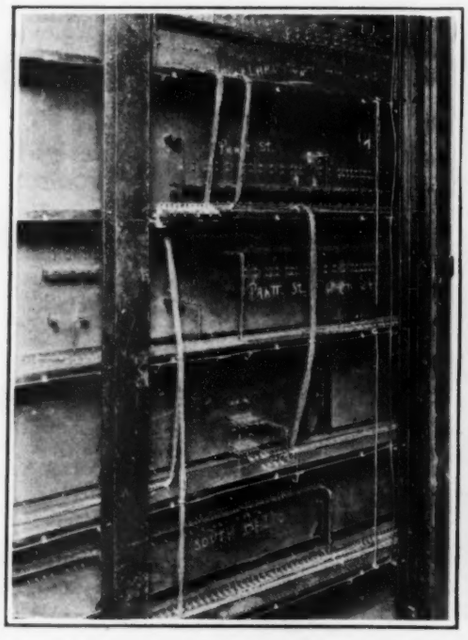
BY GLOVER PATTERSON FALLON
Assistant to the Electrical Engineer Consolidated Gas, Electric Light & Power Company of Baltimore

THE Consolidated Gas, Electric Light & Power Company, Baltimore, has just put into operation a modern and completely equipped load dispatcher's board. Heretofore the load dispatcher has been more or less closely associated with the operators of one of the larger generating stations in Baltimore, but with the completion of the isolated phase switch house at Westport it was decided to construct a board that would be modern in all respects—one that would provide for system expansion—and at the same time to renovate the communication facilities.

The new dispatcher's office has three sides formed by the board itself, the center section being 24 ft. long and the two wings, on either end, 8 ft. The fourth side is the north wall of the building and contains three large windows, plenty of light without undue glare being thus afforded. The main or center section contains the wiring diagrams of the principal or "city" substations, whereas the wings contain mainly the wiring diagrams of customer services, indicating their relative positions on the various cables out of the different substations. The board itself is made up of $\frac{1}{8}$-in. rerolled steel plates having an extremely smooth, even surface. These plates have a $\frac{1}{8}$-in. bevel to indicate the limits of each station and are fastened to a framework of T bars, as shown in Fig. 2. These T bars are connected by means of angles 15 in. long to the vertical H columns, which are placed 4 ft. apart. This type of construction is very flexible in that it allows the removal of any one plate. The plates may be lengthened (horizontally) by simply moving the vertical T's and their width (vertical) can be doubled, as is done in several cases, by extending them to the next horizontal T. This will allow for expansion and even an entire rearrangement of substations. It is expected that this will be frequently necessary with the smaller panels containing customer services.

No attempt has been made to show any services of less than 13,000 volts except in those stations having no high-tension oil switches. In such a case the oil switches connecting the transformers to the low-tension buses have been indicated. Similarly all rotary converters have been omitted, inasmuch as their operation does not affect the decisions of the load dispatcher. A logical color scheme to represent voltages and frequencies has been worked out. Beginning at white for 13 kv., the 25-cycle circuits approach a dark gray as their voltages increase, and on the 60-cycle system the 13 kv. begins with a cream color and approaches a deep orange as the voltage goes up. The main station buses, regularly known as "red" or "black," have a small line of their own color down the center to distinguish them. Several coats of flat black paint form the background for the entire board.

A small brass bushing bolted through the steel plate indicates a disconnect, and its closed position is shown by the insertion of a red plug. When a particular circuit is out of



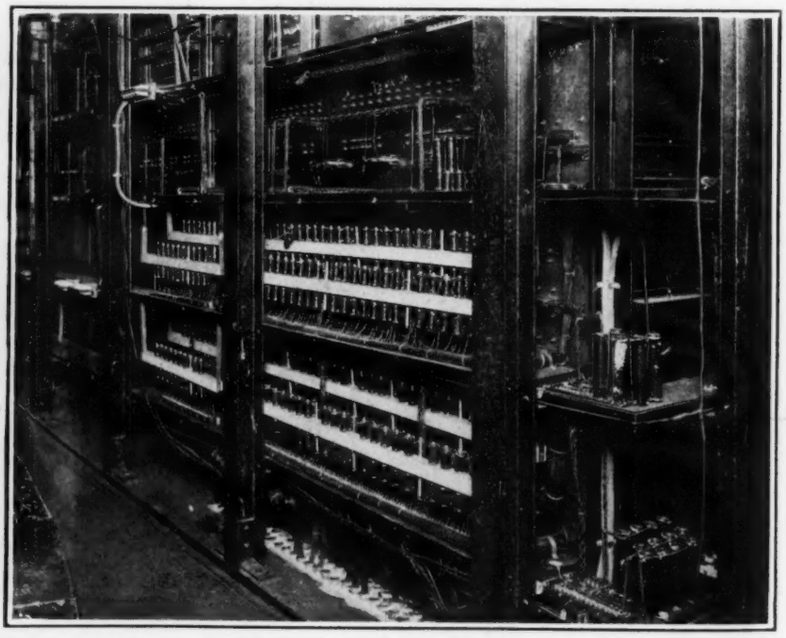


FIG. 1 (LEFT)—REAR OF BOARD, SHOWING DETAILS OF CONSTRUCTION. FIG. 2 (RIGHT)—RESISTORS USED IN OIL SWITCH CONTROLS

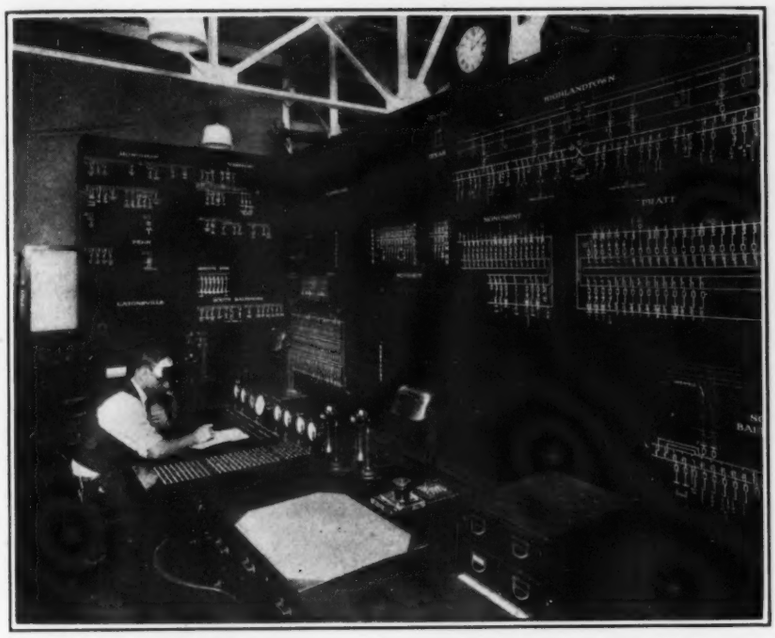


FIG. 3—GENERAL VIEW OF NEW LOAD DISPATCHER'S OFFICE IN BALTIMORE

service for maintenance or repairs, the department doing the work is indicated by inserting a plug. Oil switches are represented by a rectangle containing small red and green lenses, each approximately $\frac{3}{4}$ in. diameter. Alternators and frequency changers are represented by larger ($\frac{7}{8}$ in.) red lenses. Live buses in the generating stations are shown by small white lenses, and when an oil switch is being overhauled the green lens is replaced by a blue one. Customer services show only the incoming oil switches. Their relative positions on the various cables are shown, and their "normal" feeder is marked with a triangle in each case.

All holes for the lenses had to be jig drilled on account of the lamp sockets, mounted in strips on the rear of the board. It was necessary that the small lenses come exactly in front of each lamp. The sockets were usually spaced every 2 in., and the strips fastened to the board with small angles, bolt holes being tapped in the steel plates.

Wires from the sockets are brought down in forms to terminals mounted on 6-in. boards placed between the T bars and H columns as shown in Fig. 2. The Westport section is controlled automatically by inserting resistors in the oil switch indicating light circuits and tapping the dispatcher's board lamps across these resistances. All other lights are controlled manually from the dispatcher's desk as soon as switching orders are confirmed. The two banks of keys on the desk are connected to twelve 55-pair telephone cables, which are terminated at various centralized locations on the rear of the board on connecting blocks. Jumper connections may then be easily run between these blocks and the rows of terminals, as desired. The control keys were carefully chosen so that they would have no neutral position, because an oil switch is either open or closed—or else it needs the dispatcher's immediate attention. The wiring and equipment on the rear of the board is protected by the installation of asbestos lumber doors.

The new telephone board, in the center of the dispatcher's desk, replaces eight telephone instruments serving ten lines, each having several stations. The board was designed and equipped for an ultimate capacity of 30 lines in three groups of ten each. At the present time there are connected to it direct lines to the generating stations, main city substations, chief operator's office and trouble desk. These lines give direct instantaneous communication between each individual station and the load dispatcher or vice versa, and do not provide for cross-connections. Any necessary intercommunication (which is not necessary for operating instructions) is accomplished through the local private branch exchange, a fourteen position board attached to the Bell system, which also has lines to each station. The lines are divided among the three groups on the board as follows: First, generating stations; second, main substations; third, minor substations; and in cases of emergency all phones in any one group may be called simultaneously and orders given to the entire group by pressing the proper one of the three grouping keys. This allows a very rapid transmission of orders and expedites the restoring of service after an interruption.

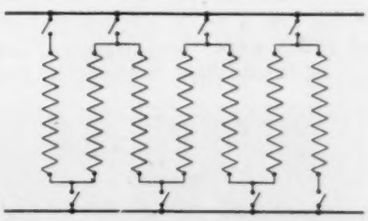
Instruments on the edge of the dispatcher's desk indicate voltages, frequencies and loads on various parts of the system, which may or may not be operating in parallel. At present a system of graphic indication of loads on remote stations is being seriously considered and will probably be installed to complete the dispatcher's equipment, which has been in process of design and construction for the past two years.

Flexible Load Device for Routine Meter Testing

BY CARL W. EVANS
San Antonio Public Service Company

IN THE routine testing of electric meters on consumers' premises the problem presented to the tester in the design of his testing outfit is chiefly confined to a determination of the type of loading device best adapted for testing, considering the conditions peculiar to his community.

One type of resistor that can be used to advantage as a load for meter testing is the heating element from electric heaters of the reflection type. It is well adapted to this use on account of its standard Edison base, being easily replaced when burned out and also simplifying the design of the testing outfit, since ordinary cleat sockets, with porce-



SWITCHING ARRANGEMENT FOR OBTAINING EITHER SERIES OR PARALLEL CONNECTIONS

lain removed, may be used to hold resistances in place.

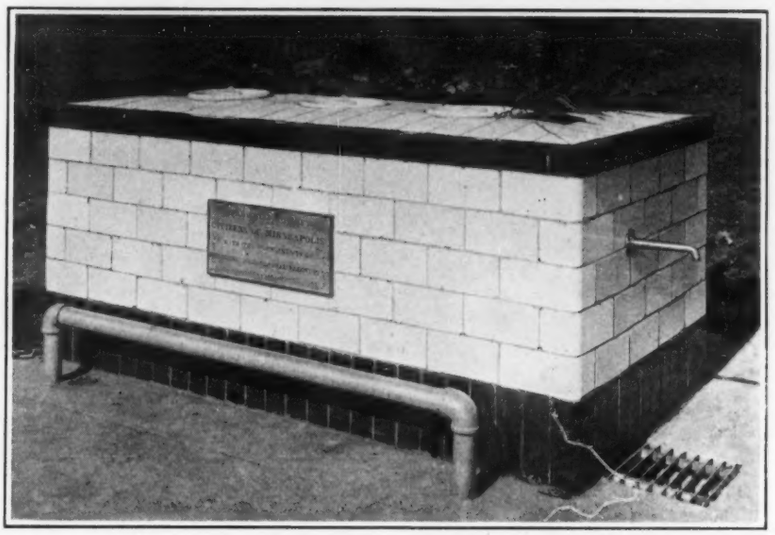
The accompanying diagram shows a scheme of connections whereby a number of these resistances may be connected either in series or parallel, thus giving an extremely flexible load. For testing meters up to a capacity of about 25 amp., at 200 volts, only nine of the units are required, each resistor drawing approximately 3 amp.

Commercial Activities and Public Relations

Second-Floor Auditorium Proves Good-Will Builder

CONTRACTOR-DEALERS who have a second story above their stores at their service may find a profitable example in the experience of the Home Gas & Electric Company of Greeley, Col. In place of utilizing its second floor for storage, the Greeley company has converted it into an auditorium, suitable for luncheons, dances, banquets and similar social or business gatherings. A partition has been erected 15 ft. from the rear, creating a kitchen, where electric ranges and other facilities have been installed. The management has offered this space free of charge to the local men's or women's organizations. The only expense involved is for janitor service. As a consequence the Chamber of Commerce of Greeley and various of the business luncheon clubs and other organizations use it for their banquets and midday meetings, and nearly every afternoon it is occupied by some women's social club or church society. Incidentally the company also finds it of value for its own use occasionally when such an enterprise as the recently conducted cooking school calls for a public gathering.

This auditorium brings into the building hundreds of persons who would not otherwise find themselves in the neighborhood and does much to engender a spirit of community good will toward the company. The value in friendships made with the members of the various clubs who come to regard this building as their second home is inestimable.



DEEP-WELL FOUNTAIN IN RESIDENCE SECTION MADE POSSIBLE BY SUBSTATION

Public Drinking Fountain Makes Substation Attractive

REMEMBERING the public may take form in various ways and bring a return far more valuable than the time or money expended in doing so.

Having decided to drill a deep well to provide cooling water for the transformers at its Garfield substation (which is in a residence section of Minneapolis), the Minneapolis General Electric Company concluded to build a public drinking fountain in front of the substation, making available the surplus water from this well. The fountain, which is constructed of glazed tile, has three drinking cups and a flower border on top and a spout at one end. On the front of the fountain is a bronze tablet reading, "Presented to the Citizens of Minneapolis with Compliments of the Minneapolis General Electric Company."

While the writer was observing it, three truck drivers and several pedestrians stopped for a drink or to fill a pail with water, which is much cooler than the city supply. Newspapers have voluntarily referred to the fountain as just one of many ways in which the local electric-service company remembers the public. Several citizens have said that they would object to the substation being removed if it meant discontinuance of the public deep-well supply.

ENTRANCE TO SECOND FLOOR COMMUNITY AUDITORIUM IS THROUGH APPLIANCE SALES DEPARTMENT OF ELECTRIC COMPANY

N.E.L.A. Gets Out Appliance Advertising Plan

THE plan book of concurrent advertising campaigns on electrical appliances for the fall and winter of 1926 and the spring of 1927, which is sponsored by the Commercial National Section of the National Electric Light Association, is now available. The results derived from the first two campaigns, in March and April of this year, in the

sale of toasters and percolators have encouraged the Commercial Section to make the larger plan for the coming year to include a greater range of appliances.

The book outlines the plans of manufacturers for advertising in national publications, and gives the periods in which particular appliances will be featured. From Sept. 15 to Oct. 15 the merits of electric heating in the home will be extolled; from Oct. 15 to Dec. 25 the Christmas trade will be appealed to by featuring electric appliances as gifts; in February, March and April, 1927, national advertisers will devote space to waffle irons, toasters and percolators in the order given. All central stations and dealers in electrical appliances are urged to tie in with the national advertising by taking space in their local newspapers and also to use such means as they can devise themselves or are furnished by manufacturers for direct-by-mail advertising in conjunction with the national and local campaigns.

The plan book presents instructions so that any local seller of electrical appliances can benefit from the extensive and intensive advertising by using such publicity in his local mediums as will identify himself with the campaign. The book contains a number of suggested advertisements that may be filled in with the local merchant's name and the pictures of such appliances as he desires to feature. Manufacturers also are prepared to furnish advertising copy with illustrations in the form of mats and cuts to all dealers who are selling their goods.

The effect on sales of these concurrent advertising periods is bound to be very great. A householder who reads about a certain toaster in every national magazine he picks up, who is informed by an advertisement in the local newspaper that he can purchase that toaster from a certain dealer and who receives from that dealer through the mail an invitation to come down and purchase the toaster finds that he is being gently pushed quite a long way on the road toward having that toaster on his breakfast table. It is only through the utilization of such means as this that the domestic consumption can be built up from its present low average figure of about 360 kw.-hr. per year to the conservative estimated possible domestic use of 1,200 kw.-hr. per year.

RECORD OF SCHEDULE "J" CUSTOMERS

A B C COMPANY, 999 Main Street

CONTRACT No. 100 Date Signed Dec-6, 1919 Date Effective Dec. 20, 1919

Signed by John W. Merlin, President ABC Company For Customer.

Signed by Edison Smith, - D Electric Company For Central Station

HP in motors 824 HP Kw. in lighting 42½ Kw. Kw. in heating _____

Fuel Clause Based on $6.00 coal.

Lighting Rate Sched. "B"

Minimum Charge Basis 65¢ per kilowatt

How obtained Renewal

CORPORATION

Capitalization _____

Property owned land $80,000.00 Buildings $235,500.00

Officers _____

Man to see Ford McAllister, Supt. Phone No. P-8000

Rating _____

Products Mfg. Machinery

No. of employees _____

FIG. 1—GENERAL RECORD SHEET FOR LARGE POWER CUSTOMER

Keeping Special Records of Large Power Installations

TO ENABLE its sales engineering staff to keep closer watch of the use of service and the development of loads in larger power installations, a New England central station began this year to maintain a loose-leaf record book of each important industrial customer's plant and operating data. Typical sheets from this record are reproduced herewith. Fig. 1 contains the more essential information which the company desires to have in hand at all times regarding the number and term of the contract, official signing it on behalf of each party thereto, rate applying, connected load, customer's representative to see in subsequent negotiations, etc. Space is provided for various general data bearing upon the resources and products of the customer, and it is planned in time to accumulate as much information as may be available upon the productive output of the establishment in order that the use of power may be checked against the consumer's volume of manufacturing and unit data obtained and kept up to date on the energy consumption per unit of manufactured product.

The table gives a yearly tabulation of the use of energy by the

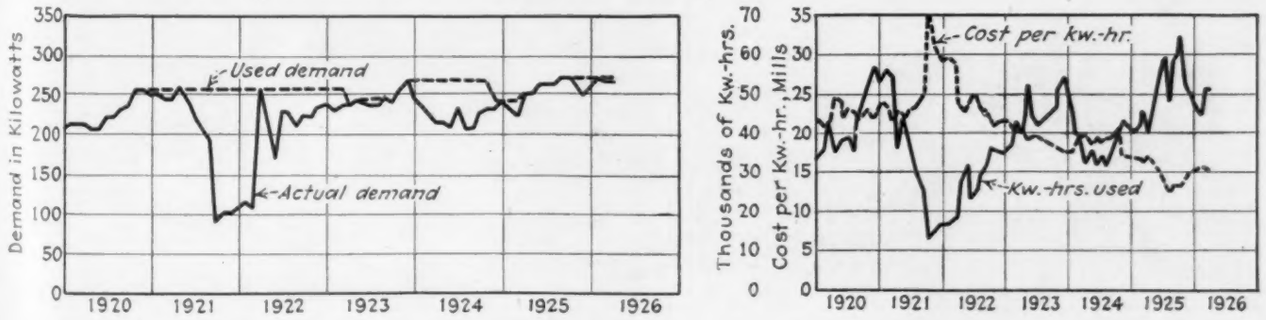


FIG. 2—GRAPHS OF MONTHLY VARIATIONS IN DEMAND, ENERGY CONSUMPTION AND COST OF SERVICE PER KILOWATT-HOUR

ANNUAL ENERGY USED, BILLING AND DEMAND DATA

RECORD OF SCHEDULE "J" CUSTOMERS

A B C COMPANY, 999 MAIN ST.

Year	Kw.-Hr. Used	Bill	Fuel Charge	Total Bill	Cost Kw.-Hr.	Max. Dem.	Hrs. Use Dem.	Remarks
1920.....	520,680	7,879.65	3,521.94	11,401.59	.021897	260	2003	
1921.....	378,470	6,495.03	2,565.56	9,060.59	.02394	260	1456	
1922.....	345,210	6,193.69	1,726.05	7,919.74	.02294	260	1328	
1923.....	549,660	7,979.30	2,380.12	10,359.42	.01885	272	2021	
1924.....	441,900	7,074.90	1,003.02	8,077.92	.01828	272	1625	
1925.....	605,620	8,633.43	626.60	9,260.03	.01529	280	2163	

customer, fuel charge, billing and demand data, and on sheet 3 (shown in the illustration) are plotted from month to month the actual and billing demands used by the customer, the cost to him of energy per kilowatt-hour and the energy consumed, this sheet being pasted upon a punched blank. One clerk can maintain these records for about 50 customers by devoting two hours per month to the task. For quicker reference the customer data typed are recorded in red on the actual sheets used.

Icemen and Central Station Co-operate

QUICK to recognize the domestic electric refrigerator as offering a twofold opportunity to the iceman, the largest retail ice distributor in the city of Portland, Ore., has actively gone into the merchandising of a popular make of electric household machine. This distributor, who distributes ice for four of the large ice manufacturers of the city, feels that by co-operating with the central station in an advertising and educational program he not only can sell more ice by reason of the greater demand created but can realize a nice profit from the sale of electric machines as well.

A plan has been worked out between this distributor and the Portland Electric Power Company whereby the central station will buy refrigerators in carload lots to supply the requirements of both parties, thereby securing the most advantageous price for each. All machines sold will be serviced by the party making the sale for the first year under the manufacturer's guarantee without cost to the customer. The central station will act in an advisory capacity in selling and servicing all makes of mechanical refrigeration of proper design and construction.

All advertising, educational and promotional work will be directed toward selling the idea of refrigeration for the proper care and preservation of foods. In the case of the power company's advertisements the electric machine will be shown as the ideal, whereas the ice distributor is able to offer ice as well as the domestic electric machine. Part of his prospects for electric machines will be secured through his deliverymen reporting consumers who discuss electric refrigeration, also from solicitors while selling coupon books. The latter method furnishes more prospects than any other, as the customers are very happy to inform the ice company of their intention to purchase an electric machine.

The whole plan as developed and now in effect cannot help but work out advantageously to both parties. First, because the central station receives a greater refrigerator load than it can possibly secure through its efforts alone, and second, the iceman sells more ice because of the greater demand, and third, he makes a profit from the sale of electric machines, which will offset for some time the loss of revenue from the sales of ice to consumers whom he might have lost in any event. Under this plan it is expected that at least 1,000 electric machines will be sold during 1926.

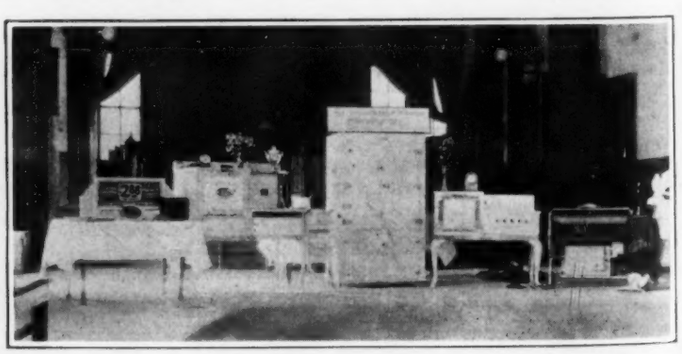
Co-operative selling in this way is in line with the attitude of the more progressive ice manufacturers and distributors, as evidenced at the convention of the National Association of Ice Industries in Los Angeles last November and at a meeting in February in Seattle of the Northwest Association of Ice Industries. At the latter meeting a resolution was passed asking the central stations to co-operate with the icemen in an advertising campaign to educate the public to greater use of refrigeration for the proper care of foods. A week later at Spokane the Northwest Electric Light and Power Association (Geographic Division, N.E.L.A.) indorsed the same resolution.

Demonstration Unit Aids Appliance Sales

A SERIES of very effective sales demonstrations, in which a variety of electric appliances were transported by automobile truck through some of its rural territory and set up and placed in operation in amusement halls in a number of towns, was conducted recently by the Utah Power & Light Company.

The demonstrations were in charge of two members of the company's sales organization, one of whom was a lady demonstrator.

About twelve towns were visited in the company's Ogden division, and the attendance at the demonstrations averaged about 30 per cent of the total number of residential customers served in these towns. Excellent results in the form of sales are being noted, for a number of which these demonstrations are responsible.



PORTABLE DEMONSTRATION UNIT, READY FOR TRANSPORTATION AND FOR DISPLAY

Digest of Electrical Literature

Hydro-Electric Development and Steam Equipment

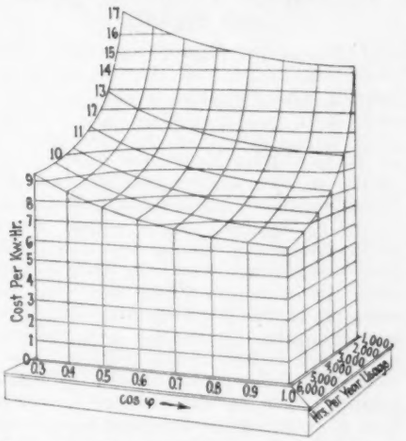
Higher Steam Pressures in the Industrial Plant.—W. F. RYAN. — This paper attempts to show that the gains from high pressure are greater in the industrial plant than in the central station and that except for the question of suitable feed water for high-pressure boilers the problems involved are less difficult. The relative cost of power for varying initial pressures is estimated. The relative efficiency of turbine and engine prime movers and the application of higher pressures to manufacturing equipment are discussed. It is indicated that pressures up to the present commercial limit, about 1,200 lb. per square inch, may be used advantageously in the industrial plant that has a high load factor and in which the demand for power is high in proportion to the demand for process steam.—*Power Notes*, June, 1926.

Generation, Control, Switching and Protection

A New Electrical Converter.—A converting apparatus, consisting of one machine only, capable of being arranged to take alternating current of any voltage, including high-tension supply, without the use of transformers and at the same time of delivering direct current of any voltage independent of that of the alternating currents should find a wide field of application. This field of application would be still further enlarged if it should be possible to arrange the direct-current side so as to have any desired characteristic, series, shunt or compound, or even such special characteristics as are required for welding purposes. This article takes up in detail the description of such a machine. It is being built under Creedy's patent in England, and is believed to form a type of converting apparatus presenting marked advantages over every other. The characteristics of the Binary converter closely resemble those of the motor-generator, its chief advantage over this apparatus being the much greater compactness and lighter weight, and above all, the very much increased efficiency, together with the very moderate cost of the converter. The motor-generator and the Binary converter are the only known types of apparatus in which the direct-current side can be regulated in a manner entirely independent of the alternating current. Another advantage of the Binary converter is that the number of poles of the direct-current and alternating-current sides are almost entirely independent, so that the speed of the set is not kept low because a large number of poles are desirable for commutation purposes on the direct current end, nor need it be made undesirably high if it is desired to operate the direct-current end with very few poles. The Binary converter may be constructed to work as a synchronous or induction machine, though the latter is usually adopted in the sizes described in the article.—*The Engineer, England*, April, 1926.

Units, Measurements and Instruments

Current Rate Model.—H. NISSEL.—To stimulate the use of electric power, the Berlin Municipal Service Company has calculated a flexible current rate, based upon the number of annual hours' usage and the power factor of the load. To visualize to better advantage the relation between these three variables (annual hours, cos φ and cost per kilowatt-hour) a three-dimensional model was made and photographed, the concave upper surface of which is the



GRAPHICAL REPRESENTATION OF A NEW RATE SCHEDULE INTRODUCED IN BERLIN BY POWER COMPANY

geometrical locus of the cost for varying values of the variables. A picture of this model with appropriate wording is being used as propaganda material among the present and prospective customers. — *Elektrotechnische Zeitschrift*, May, 1926.

History of Electric Meters.—W. STUMPNER.—Beginning with Edison's electrochemical, direct-current meter, the author gives in this paper a condensed historical development of watt-hour meters. Substantiated by the citation of the first publication and the patent number of each meter mentioned, the designs are grouped according to their principles, such as chemical types, magnetic types, motor types, induction types and swinging types. Finally double rate and maximum rate meters are mentioned. — *Elektro-technische Zeitschrift*, May and June, 1926.

Some Curious Cases of Power Factor. — FREDERICK BEDELL. — The introduction to this paper contains a general explanation and definition of power factor, and the discussion follows with reference to special cases of power determination, where varying combinations of a fundamental and numerous harmonics are present in the wave.—*Sibley Journal of Engineering*, April, 1926.

Transmission, Substations and Distribution

High-Current Transformers.—C. ALBRECHT.—Particularly for the supply of electric furnaces, transformers of low secondary voltage but very high current are required. In addition, such transformers suffer during their normal operation frequent and severe momentary overloads of almost short-circuit character. These reasons account for special design and construction of transformers for this kind of service. Both the shell-type and the core-type design are suitable, the latter, with horizontal core, giving certain advantages for very high currents. As most of these machines must be provided with voltage taps, a careful balancing of the tapped-out sections must always be observed to avoid excessive mechanical stresses. Heating and additional losses are sometimes encountered when a number of high-current leads have to be brought out through the steel cover of a transformer. Some general rules of bar interlacing are given to reduce these losses. In common with other transformer types, furnace transformers are all built as conservator types, which requires absolute oil-tightness of all leads.—*Siemens Zeitschrift*, April and May, 1926.

Modernization of Switchboard Rooms. H. PUPPIKOFER.—The article gives a description of the changes that have taken place within the last twenty years in switchboard equipment for large power plants in Europe. On a number of latest installations the author's plausible viewpoints are illustrated.—*Bulletin de l'Association Suisse des Electriciens*, May, 1926.

Illumination

The Problems of Illumination.—The Illumination Research Committee of the Department of Scientific and Industrial Research, England, has undertaken an investigation of the illumination difficulties in industry. A matter of fundamental nature for which a solution is being sought is the relation between the degree of illumination and the ease and accuracy of performing fine work. The light transmission properties of window glass have also received some attention, and nine different kinds of glass, including varieties of prismatic glass, have been experimented with in association with direct lighting, the passage of diffused light and also when the beams are restricted to angles of incidence greater than 45 deg. Another problem already investigated was the compromise that was advisable between freedom from glare and efficiency with enameled-iron reflectors for direct lighting in industrial and other premises.—*Engineering, England*, June 25, 1926.

Motors and Control

Three-phase Motors with Changeable Number of Poles.—M. LIWSCHITZ.—The author gives a theoretical explanation of the change of electrical characteristics of induction motors when their number of poles is being changed to obtain a different speed of rotation.

For drives where two distinct speeds are required, such as, for example, on rolling mill motors, a pole change is a simple and economical way to accomplish this. The winding of the stator has to be specially designed to permit this change-over. On practical examples of motors built by one concern during the last few years the writer shows how much stators have to be wound to give pole ratios of 1:2, 1:3, 2:3, 3:4 and 5:6. For a few cases the complete winding diagram of the stator is given. — *Elektrotechnische Zeitschrift*, May, 1926.

Variable Armature Leakage Reactance in Salient-Pole Synchronous Machines.—VLADIMIR KARAPETOFF.—In the present paper the leakage inductance is assumed to consist of two parts, one of which is constant and the other varying harmonically at a double frequency, reaching a maximum opposite the centers of the poles. A magnetic linkage equation is written, and its derivative with respect to the time angle is taken to obtain the induced voltage. The result shows that the foregoing assumption leads to two reactive drops, one the usual average Ix drop and another a supplementary drop leading Ix by an angle 2θ where θ is the internal phase angle at which the machine is operating. These quantities are introduced in the usual Blondel diagrams for the generator and the motor, and the relationships among the various quantities are established both graphically and analytically. — *Journal of the A.I.E.E.*, July, 1926.

Electrophysics, Electrochemistry and Batteries

Increase of Voltage in a Primary Cell by Heat.—K. WINDMILLER.—This short report describes a hitherto apparently unobserved phenomenon on voltaic cells. A small wet cell was assembled, with a copper rod in a $CuSO_4$ solution as anode and a zinc wire in a porous clay cylinder in diluted H_2SO_4 as cathode. Discharging 2½ amp., a potential of 0.116 volt was measured. Provision was then made to heat the zinc wire electrically, whereupon the current increased to 4.55 amp. at a potential of 0.249 volt. This means that the current increased 82 per cent and the potential increased 114.66 per cent. The author offers as an explanation the possibility that by heating of the electro-positive zinc electrode the solution pressure has been increased, which accelerated the emanation of positive ions or possibly of free electrons. — *Elektrotechnische Zeitschrift*, May, 1926.

Heat Applications and Material Handling

Comparison of Gas and Electricity for Industrial Heating.—R. C. GOSREAU.—Electrical and gas heating compete mostly in the range from 100 to 2,000 deg. F., which covers the largest part of the field of each. Although many operations using gas are conducted at temperatures above 2,000 deg. F., the cost of gas fuel on these installations very nearly equals the cost of electric energy in most parts of the United States. The choice as to application is properly divided into two considerations —an economic and an engineering consideration. The recent rapid increase in the amount of current used for melting and heating metal shows that electricity can often compete economically where quality is paramount. Inevitably in the choice of direct-resistance heating the shape of the piece to be heated is a governing factor. An intricate piece cannot be made to carry a current satisfactorily and heat uniformly. The direct-resistance method is successfully applied to straight pieces and also to welding, shrinking and surfacing operations. As a consequence the cost of a fuel is not the determining factor; but the degree of utilization is the prime, important and only factor to consider in its application in any heating process. *Chemical and Metallurgical Engineering*, June 1926.

Telegraphy, Telephony, Radio and Signals

A Unicontrol High-Frequency Radio Direction Finder.—F. W. DUNMORE.—Such a device enables a ship equipped with it to locate another ship readily. This paper describes the development of such a direction finder and its installation on a coast guard patrol boat. The direction-finder coil consists of four turns of ignition cable wound on a 20-in. frame. A tuning unit and coupling transformer has been designed so that the direction-finder coil may be used on the ship's receiving set without changing its tuning adjustments, which are locked in the 2,100-kc. position. The controls necessary when taking a bearing are reduced to one—that of rotating the direction-finder coil to obtain the minimum signal.—*Bulletin No.* 525, U. S. Bureau of Standards.

Traction

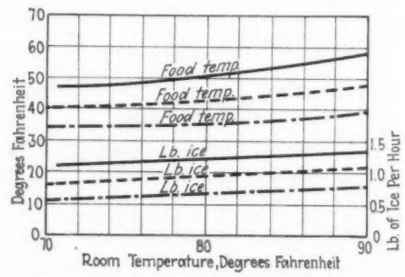
Havana Railway Operation Combines American and Cuban Method. — Extremely narrow streets and close spacing of stops have created operating difficulties. Fares are low and no standing passengers are carried. The double-type trolley wire is used, supported by a unique overhead construction.—*Electric Railway Journal*, July 3, 1926.

Extensive Modernization Program for London Underground.—The Central London Railway is making sweeping alterations in many of its wooden trail cars with the hope of increasing operating efficiencies very largely. A new standard for tube cars has been adopted and many new cars have been purchased. The modernization program is limited to the Central London Railway at present.—*Electric Railway Journal*, July 10, 1926.

Advantages of Electric Drive for Gasoline Buses.—H. L. ANDREWS.—Higher speeds, more efficient utilization of engine, less mechanical strain and reduced maintenance costs are claimed with this type of vehicle. In actual service tests with electric drive the maximum engine speed obtained during acceleration or when climbing severe grades is approximately 1,700 r.p.m. and normally in frequent stop service the maximum speed seldom exceeds 1,500 r.p.m. Duplicate tests with mechanical drive when attempting to maintain similar schedules show maximum engine speeds of 2,000 to 2,600 r.p.m. in the intermediate gear position. The electric drive reduces the engine peaks during acceleration approximately 40 per cent. The most important point is high schedule speed with smooth acceleration, greater comfort for passengers, quiet operation and greater safety by reason of less manual duty on the part of the operator and better control of the bus.—ELECTRIC *Railway Journal*, July 10, 1926.

Miscellaneous

Refrigeration.—A. R. STEVENSON, JR.—This article covers the subject of refrigeration from natural refrigeration through ice, early ice machines, thermal characteristics of iceboxes and domestic refrigerators, and gives a treatise of the thermal and electrical analogies for the refrigerating cycle.



CURVES OF FOOD TEMPERATURES IN RELATION TO ICE CONSUMPTION IN REFRIGERATION

Several cost tables as well as temperature diagrams are included in the article, along with line diagrams of steam-driven compressor plants, brine tanks and auxiliary equipment, and electrical refrigerating machines. — *General Electric Review*, July, 1926.

Overvoltage Protector.—W. HOFFMAN.—Experience of several years showed that the old-style horn gap arrester may be changed into a very serviceable arrester by adding to it a properly designed and dimensioned oil-immersed resistance. The theory of overvoltage protection demands this resistance to be small for quick transients and to be large for overvoltages of long duration, such as arcing grounds. Any attempted compromise between these two values is useless. The new protector contains therefore two widely different ohmic resistances in series with each other and the horn. A small contactor, located under oil, keeps the high-resistance part short circuited. If the overvoltage lasts for more than about two cycles, the solenoid of the contactor picks up and the full ohmic resistance is inserted. An oscillograph illustrates the operation of this arrester. For three-phase protection the resistances and the contactors for all three phases are located in a round oil tank, and on its cover are mounted five horns. This type is built up to 35 kv. Above this potential, up to 100 kv., each phase has its own tank.—*Siemens Zeitschrift*, May, 1926.

News of the Industry

Proposed Indeterminate Franchise Law

Effort to Make Utility Tenures Uniform in All States Expected to Profit Both Public and Utilities

CONTROVERSIES between the public and the public service corporations will be to a large extent eliminated under a uniform public utilities act now ready for adoption on second reading by the national conference on uniform state laws, according to Prof. E. Blythe Stason of Ann Arbor, Mich., a faculty member of the law school of Michigan University and the draftsman of the public utility act for the committee, of which Hazen I. Sawyer of Iowa City, Iowa, is chairman.

The keynote of the proposed act will be to strike the happy medium of all the 47 laws that now exist on the subject, give greater justice to the corporations, greater protection to the public and more elasticity in adjusting differences between the two.

"Much of our trouble over public service franchises was inherited from the days when such franchises were given in perpetuity," said Professor Stason. "Other franchises were given for 100 years, or periods nearly as long, and they brought trouble in their train, for the corporations holding them were generally too autocratic and too indifferent to the wishes of the people and to changed conditions of business.

Limiting of Franchises Causes Trouble

"Then came the swing of the popular pendulum and franchises were limited to twenty years or so. This brought additional trouble, for when those franchises were about to expire the corporations were faced with the problem of securing a new franchise or seeing their property junked. Bitter fights ensued, and frequently great loss to the corporations as well as to the public they served.

"Under our proposed new law the principle of indeterminate franchises has been adopted; that is, the granting of a franchise without a specified time limit and on the principle of good behavior, as it were. This franchise may be canceled by reason of disuse, by reason of flagrant and proved disregard to public service or by abuse of privileges. Also, the holding corporation is subject to all new legislation that may be found necessary by reason of advanced conditions or scientific discoveries. This is a feature not found in the old-time franchises. On the other hand, the franchise provides that the corporation is entitled to a reasonable return on its investment, and the amount of that return is left to the determination of the courts. The meaning of 'fair and reasonable return' now is pretty generally established.

"The general purpose of the proposed law is to strike the happy medium of all existing laws, selecting the good features that are common to many and rejecting, or modifying, the most radical on both ends of the scale. The idea is that a healthy, thriving public utility corporation that performs its duty efficiently is a benefit to the public and to the community that it serves. But due regard is taken to protect the public from all assumption of monopolistic rights and from charges in excess of what may be necessary to provide a fair and reasonable return on the capital invested. It will tend to eliminate the ruinous controversies that have been so frequent between municipalities and the public service corporations that serve them in various capacities."

Illinois Legislator Favors Terminable Permit

Asserting that "the terminable permit idea appears to appeal to most reasoning persons who have given adequate study to the question," State Senator Richard J. Barr of Joliet, Ill., who is chairman of the Illinois legislative joint commission which has been investigating terminable permits, continued:

"I can think of no valid reason why a utility should not be permitted to give the service for which it is organized. The public should not be denied service and its full rights. It is the opinion of most students that short-term franchises hinder, and sometimes prevent, a utility from financing itself upon any proper basis, and it follows necessarily that without proper financing a utility cannot give adequate and fair service.

"There were excellent reasons for a short-term franchise. When it was fully justified there was no attempt at regulation. The city, in granting a franchise, said there must be a day of reckoning, a squaring of accounts. Accordingly it fixed a short term so that there could be a readjustment with expiration of the franchise. But that was before the days of regulation. Now it is different. No utility should have a franchise for a month beyond its good behavior. A terminable permit seeks to grant a right to operate only during good behavior, so long as the utility gives good service at a reasonable charge. When a utility is unfair, when it charges too much and gives too little, its right to operate should be terminated."

Senator Barr said that these were his personal views and that he was not undertaking to speak for the commission, whose report is not yet ready for publication.

Insulls Acquire National Electric

Purchase Controlling Stock in Emanuel Holding Company — Important Expansion of Insull Interests in New England—Properties Will Be Included in Middle West Utilities Operating System

ANNOUNCEMENT was made July 27 by Insull Son & Company, Inc., that it had purchased an interest in the common stock of the National Electric Power Company and that the company would be continued as organized, with Victor Emanuel as vice-president. Representatives of the Insull utilities interests described this purchase as an investment.

Insull Son & Company, Inc., is an Illinois corporation formed two years ago to do a financial business with Samuel Insull chairman of the board and his brother, Martin J. Insull, as president.

While the price at which the Emanuel properties were held has not been disclosed, it was pointed out that the Middle West Utilities Company recently offered publicly $7,000,000 par value of preferred stock, with the announcement that the proceeds were to be used in part for the acquisition of new properties. It is expected that a bond issue will be floated also in furtherance of the sale.

Control of the National company is vested in 460,000 shares of outstanding class B no-par common stock, and although the announcement made no mention of the amount of this stock purchased, it was believed to be nearly 100 per cent.

This voting stock was held closely by the Emanuel interests, and it was said on good authority that it was represented by not more than one or two certificates. The price paid for the stock therefore may never be known.

The properties of the Emanuels standing in the name of the holding company, National Electric Power Company, comprise, besides the Cumberland County Power & Light Company, the Pennsylvania Central Light & Power, Kansas Electric Power, Eastern Kansas Power, Northwestern Public Service, Northwest Power, Ohio Electric Power and Michigan Electric Power Companies.

The properties are spread through Maine, Pennsylvania, West Virginia, Nebraska, Ohio, Indiana, Michigan, South Dakota, Kentucky, Kansas, Oklahoma and Arkansas.

The New England property controlled by the Emanuel interests, who were said to have acquired it in competition with the Insulls about five years ago, is the Cumberland County Power & Light Company. It is ex-

pected that this will be merged with the New England Public Service Company, an Insull organization, thus further strengthening the Insull interests that already dominate in New Hampshire, Maine and Vermont.

Purchase of the National Electric Power Company is believed to be the first instance of the Insull interests acquiring a holding company. Hitherto they have purchased properties direct from operating companies.

Albert Emanuel, president of National Electric, is in retirement, and the younger Emanuel has been the acting head of the company for several years. It is considered likely that Thomas O'Hara, a vice-president, will remain in the organization under the new control.

The newly acquired properties, it was said, would be distributed among the Insull operating companies or disposed of to other interests. The North American Company recently surprised Wall Street by purchasing control of a property jointly with the Insulls and for this reason it was thought some of the National Electric properties would eventually come under North American control.

The Insulls now share importance in New England with the New England Power Association, which is affiliated with the Northeastern Power Corporation and the International Paper Company.

The Cumberland County Power & Light Company is a Maine organization that provides all electric light and power for Portland and its vicinity. It also operates the street railway in Portland and provides light and power at other points in Maine.

Death of Franklin S. Terry

Incandescent Lamp Pioneer and Consolidator of Numerous Lamp Manufacturing Companies Dies Suddenly at His Country Home in North Carolina

FRANKLIN S. TERRY, well known in the electrical field, died suddenly on July 22 at his country home, Black Mountain, N. C. Mr. Terry was a pioneer in the incandescent lamp industry, with which he was associated for more than 35 years. He was born in Ansonia, Conn., on May 8, 1862, was graduated from the Ansonia High School in 1880 and then began his active business career as a bookkeeper with the Electrical Supply Company of Ansonia, from April, 1880, to October, 1884.

In the latter month he went to Chicago and established a branch of the same company, with which he continued until December, 1893. Meanwhile, in 1889, he had organized the Sunbeam Incandescent Lamp Company of Chicago, and when he left the Electrical Supply Company he took personal management of this lamp business, which under his direction progressed steadily.

He saw the opportunities for the incandescent lamp with the ever-expanding adoption of electric illumination, and recognized that success in the lamp business should depend upon the ability to supply the ever-persistent demand for better light, and of various types and designs of lamps appropriate to the diversified needs of life and industry. He directed his energies toward improvement of the product and made his company one of the leaders in the lamp business, conducting it until May 1, 1901, when the Sunbeam company was purchased by the National Electric Lamp Company.

He engaged with this company, first as secretary and later as first vice-president. In 1911 the company was merged with the General Electric Company. Then Mr. Terry continued with the National Lamp Works of the General Electric Company, at Nela Park, Cleveland, Ohio, of which he and B. G. Tremaine were the managers. This company ranks among the most widely-known incandescent lamp enterprises in the world.

F. S. TERRY

At the time of his death he was a vice-president of the General Electric Company and also a director of the Cities Service Company.

When Mr. Terry entered the incandescent electric lamp business he found a score of small, struggling companies, all bitterly competing and each jealous of what little progress its competitors, acting individually, might achieve.

Today the incandescent electric lamp industry stands closely united in bonds of mutual acquaintance, harmony and co-operative effort, provided with every facility for improving lamp quality and leading in the age-old quest for better light. In this remarkable transformation Mr. Terry was a prime mover, his genius for organization making him a most effective factor in the bringing together of the various lamp interests. He was one of the organizers of the National Electric Light Association when that body was founded in February, 1885, at Chicago.

In the management of his own enterprises Mr. Terry always sought, in every practical way, to increase the prosperity and happiness of his business associates and employees, and devoted much personal attention to the development of a savings and investment plan to promote thrift. He endeavored to know personally as many of his employees as possible. He wanted them to be successful and happy; as he himself has said, he would rather make men than money.

Outside of his business, Mr. Terry had an especial fondness for outdoor life, and found his most favored times of recreation those when he was "out camping." He was one of the founders of Association Island, a 60-acre island in Lake Ontario, where, in addition to its uses as a place of rest and recreation, many important electrical meetings are held during the summer months. He delighted especially in beautiful landscapes, and his fondness for artistic lawns, beautiful shrubbery and freshness and attraction of natural ornamentation was shown by the splendid effects at Nela Park, where the National Lamp Works are located, and in other places where he has had a controlling voice in the improvement of the surroundings.

His career has been marked by good judgment, the selection of congenial associates and competent subordinates, the constant forward movement in the enterprises under his control and the harmonizing of the interests of all connected with them. His social connections included membership in the Union League of Chicago and the Union Club of Cleveland.. He is survived by his wife, two daughters and a son. A brother, A. S. Terry, is a supervisor of the incandescent electric lamp business of the General Electric Company.

Customers' Dividend at Stamford

The Stamford (Conn.) Gas & Electric Company has announced a "customers' dividend" in the shape of a 50 per cent reduction in all October, 1926, bills, 25,000 customers being affected, owing to favorable earnings and net after expenses. In announcing this reduction, Alfred W. Dater, president, said in part:

"A number of factors, a few certainly temporary, and more others possibly permanent, have combined despite increasing business to keep expenses at a much lower proportion of increase. This has meant a larger profit than was estimated. The rates charged by this company are believed to be the lowest of any company in this section of the country operating in a community the size of Stamford. Conditions creating the surplus are regarded as exceptional, and may not again be duplicated. It would be unsafe as a conservative managerial policy to assume they will be and to proceed to reduce rates with a chance that an increase would follow.

"Merely because it is not certain that rates can be reduced the company saw no reason why the consumer should not still enjoy the benefit of this year's

unusual earnings. It is the settled policy of the company to give its customers the benefit of any reduction in cost that it is able to effect, and in order to do so at this time the directors have authorized a customers' dividend rather than to collect from the public more than is necessary for interest and dividend disbursements and a reasonable surplus. The month of October was selected because it is a typical month and represents a fair, average monthly use of gas and electricity."

Similar dividends have lately been declared by the central-station companies in Hartford and Wallingford, Conn., and Worcester, Mass.

Electricity in Italy

Professor Ponti of Turin Shows Result of American Participation in Water-Power Development

THE Italian hydro-electric industry and its further development was the subject of an interesting address given by Prof. Gian Giacomo Ponti, a member of the Italian Parliament, before a distinguished gathering, including the Italian Ambassador, in the auditorium of the New York Edison Company on July 19.

Professor Ponti, who heads the electric light and power company at Turin, Italy, traced the development of electricity in Italy from the first installation in Milan, in 1890. He said the plants at Tivoli, for the transmission of electricity from Tivoli to Rome, 26 km., 5,000 volts, and at Paderno, for the transmission of energy to Milan, 32 km., 13,000 volts, were the first European attempts to solve the problem of electricity for industrial purposes. The development of water power has led to the construction of plants of increasing capacity, while small plants are to be found all over Italy which represent brave attempts and are useful as experiments for development of the technique, which at the time of their installation was in its infancy.

High mountain ranges and abundant rainfall, coupled with the lack of coal, are the chief factors in the rapid development of hydro-electric plants in Italy. In addition to these incentives, Professor Ponti said, the science of hydraulics is traditional in Italy, owing to the work of centuries in regulating Italy's numerous waterways and irrigating her land, a natural condition which ages ago culminated in the genius of the great Leonardo and in the draining of the marshes of the valley of the Po.

"The geological nature of our country," Professor Ponti continued, "so extremely diversified, so broken for the most part, has forced our engineers to undertake complex studies of the different types of dams adapted to the different districts. We have built dams of various kinds which are monuments of engineering and architectural skill. The height of our mountains has compelled us to utilize very high heads which bring into play very high pressures. The Adamello plant, set up in 1907, ha sa head of 3,000 ft. The Moncenisio plant has a head of about 4,000 feet. We have under examination a project for a plant in Trentino with a head of 6,150 ft. The distance of populous towns from the mountainous district has, moreover, necessitated the transmission of energy over great distances.

"In 1924 it was estimated that Italy's electric generating capacity was 2,800,000 hp., while at the close of 1925 it was more than 3,200,000 hp., as against 1,700,000 hp. in 1919, which figures show that due to the activities and perserverance of Italian engineers the capacity was practically doubled in five years' time. The total production, which in 1914 was a little more than 2,000,000,000 kw.-hr., at the close of 1925 had reached 6,000,000,000 kw.-hr., or three times as much as it was prior to the war.

"The capital invested in all of the electrical enterprises in Italy was up to the last few years all Italian, but recently, I am proud to say—not only from the engineering standpoint but also as a representative of the Italian Parliament — American capital has joined in the financing of these useful enterprises, and we note its presence in the most important undertakings, such as the Milan Edison Company, the Piedmont, the Roman and the Venetian groups. It would be difficult to overestimate the significance of this union of Italian electrical and American financial genius in the development of electricity and its application to industry in Italy."

Professor Ponti made reference to the linking up of the various hydro-electric plants in Italy for the purpose of counterbalancing the small flow of water in the north of Italy during the winter season with the high flow in the central and southern provinces, and vice versa.

No Friction in St. Lawrence Development

In an interview given in Toronto, Canada, a few days ago, Premier Ferguson of Ontario stated that according to present indications there would be no further trouble between Ontario and New York State in the matter of the proposed power development on the St. Lawrence. He also thought that if Ontario got the co-operation of New York State in any plan of development it would greatly strengthen the hands of the province in its application to the Dominion government for power to proceed with the project.

Later, at a meeting in Brockville, Ontario, the Premier expressed the opinion that the recent conference in Toronto between representatives from the New York State Legislature and the Ontario government would be productive of results within a very few months. He further stated that the meeting with the New York State representatives marked the greatest advancement in the settlement of this question that has yet been made.

Progress Report on Upper Tennessee River

Major Fiske Says that Survey Already Made Indicates a Possible Development of 1,250,000 Hp. at Thirteen Sites at Cost of $150 a Horsepower

ACCORDING to "House Document No. 463—Tennessee River and Tributaries, North Carolina, Tennessee, Alabama and Kentucky," a preliminary or progress report sent to Congress just before its adjournment by Major Harold C. Fiske, United States district engineer at Chattanooga, who is in charge of a force engaged in making a survey of the upper Tennessee River and its tributaries in the interests both of navigation and hydro-electric development, more than 1,250,000 hp. can be produced by building thirteen dams. The cost is estimated at $150 a horsepower, including the navigation improvement features. Of the dams Major Fiske says that five should be on the Clinch River, one on the Powell, five on the Tennessee between Knoxville and Chattanooga, one between Muscle Shoals and Chattanooga near Guntersville, Ala., and one near Riverton, Ala., below the foot of Colbert Shoals. The location of the eleven most northerly dams, all in the State of Tennessee, is shown in a map printed in the ELECTRICAL WORLD for Jan. 16, page 162.

"The activities required by this survey," Major Fiske says, "may be broadly grouped into three classes—first, the assembly of all statistical data pertaining to the flow of the principal streams at established gaging stations; second, the assembly of existing maps and the making of such additional ones as are necessary to arrive at a full understanding of the manner in which the flow of water may be controlled, either in storage or in passing dams designed for power or for power and navigation; third, the tentative location of power sites; the determination of the stream flow and head available at each site and the technical study of these data in order to arrive at a just understanding of the various possibilities which may thereby be disclosed."

PROGRESS OF WORK

The work already accomplished includes the photographing, topographic surveying and mapping of the Tennessee River proper between Chattanooga and Knoxville, part of the Chucky River, the Clinch River between Clinchport, Va., and the mouth, the Powell River between Jonesville, Va., and the mouth, the Big Pigeon River between Canton, N. C., and the mouth, The French Broad River between Brevard, N. C., and the mouth of the Nolychucky River, the Hiwassee River between Hiwassee and the mouth, and the Holston River between the mouth of the Watauga River and Kingsport, Tenn. Detailed surveys have been made of nine dam sites.

Considerable additional areas have

been covered in part, certain sections having been photographed and others photographed and mapped and work is actively in progress. The work yet to be done under existing authorizations covers sections of the main river, additional areas in the Clinch and Powell, Hiwassee, French Broad, the Big Pigeon, Nolychucky and Holston River basins, and studies of the Duck River, the north fork of the Tellico River and the lower section of the Little Tennessee River.

"It was at once evident," Major Fiske reports, "from the nature of the terrain that three of the dams—one on the Powell and the two uppermost on the Clinch—would create large storage capacity and large power developments; the lower three on the Clinch should provide for navigation as well as for the development of power. With respect to power, these would be almost wholly dependent on the water discharged from the three storage dams above, and the seven dams on the Tennessee should be adapted to the needs of power and navigation.

"The greater part of the water passing these seven dams would come from streams other than the Clinch and hence, for the most part, unregulated by storage. However, the capacity of the Clinch-Powell storage is so great that, properly handled, this storage can retain surplus high-water flow from the Clinch and make it available for use in the following low-water season. By this method of operation, the minimum low water-power available at Guntersville, No. 3 Wilson dam and the Interstate dam immediately below Riverton can be doubled and that at Hale's Bar, Sherman, Soddy and White Creek, the dams higher up (and below the mouth of the Clinch), can be more than doubled.

APPLICATIONS PENDING

"In the fall of 1925 there were pending before the Federal Power Commission applications for permits for twelve of the thirteen sites and it is known that the thirteenth is being carefully studied by a local power company. In the meantime the engineer department has pursued its independent studies of this situation without as yet arriving at any final and definite conclusions. Should permits be issued these studies should be taken over by the permittees under the supervision of the department, this to the advantage of the public."

Ontario Mines to Have Adequate Power

The various subsidiaries of the Canadian Northern Power Corporation have mapped out a big program of expansion in the mining fields, and in order to report on the progress made J. B. Woodyat, vice-president and managing director of the Power Corporation of Canada, also vice-president of Canada Northern Power and Northern Ontario Light & Power, recently paid a visit to the different power plants concerned in the program.

Upon his return Mr. Woodyat said that some idea of the steps being taken to provide the mining districts with adequate power might be obtained from the fact that the subsidiaries of the Canada Northern Power Corporation will spend in the neighborhood of $1,000,000 on capital account this year. He stated that since the new interests financed by Nesbitt Thomson & Company, Ltd., had taken over Northern Canada Power, it had spent about $200,000 on the extension of its lines into the Gowganda district to supply power to several mines. The load on this line, he said, is increasing monthly, and there are other properties which will be ready to take power in the near future.

In addition to this the company, through its subsidiary the Quinze Power Company, is spending $600,000 in building a line into the Rouyn district to supply Noranda and other mines with power. This line is about one-third completed and it is expected that it will be ready for operation by November. Northern Canada is also spending $80,000 on a new substation at Schumacher to consolidate the lines entering Porcupine and from the various power plants. Its subsidiary, Porcupine Power & Telephone, which supplies the light, power and telephone services in the towns of Timmins and Schumacher, has under consideration the erection of new offices as well as a store for the sale of electrical appliances.

Mr. Woodyat added that the management of Northern Canada Power Corporation is surveying the field with a view to interconnecting the Northern Ontario and Northern Canada Power systems and improve the service.

Purchases and Mergers

Ohio Consolidation Unites Large Gas and Electric Properties—Associated Gas & Electric Acquires Four Utilities—Combination of Twenty Properties in West Central States

THE merging together of the Columbia Gas & Electric Company of West Virginia and the Ohio Fuel Corporation of Pittsburgh has been approved by the directors of the latter company. The new company will combine natural and artificial gas production and distribution with a widespread electric system to serve a total of more than 1,100,000 customers.

The New York Public Service Commission has authorized the New York State Gas & Electric Corporation, affiliated with the Associated Gas & Electric Company, to acquire four contiguous public utilities. These newly-acquired properties are: Delancey Electric Light Company, Inc., operating in a portion of the town of Hamden, Delaware County; Hamden Electric Light Company, which also operates in Hamden; and the respective electrical enterprises formerly operated by Malcolm G. Hotchkin in the village of Andes, Delaware County, and by Charles Coan in the town of Kortright, also in Delagare County.

IN THE MIDDLE WEST

Twenty public utility companies in Iowa, Nebraska, and the Dakotas have been merged and will be operated as subsidiaries of a new Milwaukee holding Company, the Central West Public Service Company. Among the companies in the merger are:

Iowa—Hawkeye State Power Company, Davenport; Three Rivers Light & Power Company, Des Moines; Belmond Telephone Company, Belmond.

Nebraska—Norfolk Gas & Fuel Company, Norfolk; Columbus Gas Company, Columbus; Albion Electric Light Company, Albion.

South Dakota—Rapid City Gas & Heating Company, Rapid City; Britton Mill & Power Company, Britton; Amherst Electric Light Company, Amherst; South Dakota Utilities Company, Aberdeen.

North Dakota—Gackle Electric Light & Power Company, Gackle; Medina Electric Light & Power Company, Medina; Tower City Light & Power Company, Tower City; Buffalo Electric Light & Power Company, Buffalo; Northern Utilities Company, Starkweather; Bowman Electric Light Company, Bowman; Hettinger Light & Power Company, Hettinger; Reeder Light & Power Company, Reeder.

The Central Illinois Public Service Company has purchased the municipal electric properties of Kinmundy, Middletown and Creal Springs. The company also has acquired the electric properties in Farina, Mendon, New Liberty, Littleton, Paloma and Coatsburg within the past two weeks.

SOME MUNICIPAL PLANT SALES

The Columbus, Delaware & Marion Electric Company has purchased the Ashley Light, Heat & Power Company of Ashley, Ohio; the voters of Fredericktown, Mo., have approved the sale of the municipal system and plant to the Missouri Electric Company; and the Arkansas-Missouri Power Company has taken over the system at Maston, Mo.

The Fulton County Gas & Electric Company of Gloversville, N. Y., has made application to the New York Public Service Commission for authority to purchase all the outstanding stock of the Broadalbin Electric Light & Power Company, serving Broadalbin, Mayfield and near-by communities in Fulton County. The Broadalbin company buys its electricity from the Fulton County Company.

By a majority of almost five to one, the city of Burns, Kan., has voted to sell its electric system to the Kansas Gas & Electric Company, Wichita, and has granted the company a long-term franchise. Burns has heretofore received service wholesale from the Wichita concern. Elk City, also in southeastern Kansas, has likewise determined to sell its plant to the Kansas Gas & Electric Company.

The Appalachian Electric Power Company has added to its properties the Gate City Light & Power Company, according to announcement made by officials of the Kingsport (Tenn.) Utilities, also

a subsidiary of the American Gas & Electric Company.

Approval of the purchase of the Holston River Electric Company of Rogersville, Tenn., is sought from the Tennessee commission by the Tennessee Eastern Electric Company. The price named is $32,000.

Third Unit at Kearny Station

Turbo-generator No. 3 of the first section of Kearny power station, designed by and now nearing completion at the hands of the Public Service Production Company, was placed in service on June 3, 1926. The unit has a rating of 39,200 kva. at 80 per cent power factor, 13,200 to 14,200 volts, three-phase, 60-cycle, and is of General Electric manufacture. This makes the third unit in a little more than six months to be connected to the lines of the Public Service Electric & Gas Company, which is operating the station under lease from the Public Service Electric Power Company. Before the end of the year two more units are expected to be put into operation, giving this first section a capacity of 205,100 kva. with three General Electric 39,200-kva. and two Westinghouse 43,750-kva. units.

The total output of Kearny station is transmitted at 132,000 volts to the Essex and Marion stations, near which it is located. The five transformer banks, rated at 45,000 kva. each, which comprise the first section of the outdoor substation, have already been placed in service and consist of single-phase self-cooled Allis-Chalmers transformers delta-connected on the low-tension side and star-connected on the high.

Rocky River Plant Authorized

The Connecticut Light & Power Company has decided to go ahead with its proposed hydro-electric development on the Rocky River in Connecticut. This development will consist of a storage reservoir having a capacity of 7,300,000,000 cu.ft. and a power station of 20,000-kw. capacity operating under a 230-ft. gross head. The Rocky River is located in the northwestern part of the state and flows into the Housatonic River at New Milford.

The Rocky River development will be unique in that the reservoir will be of larger capacity than can be filled by the run-off from the water shed of the Rocky River itself. The excess capacity of the reservoir will be filled by water pumped back from the Housatonic River at times of high water by electrically driven pumps located in the power house. Power for these pumps will be supplied from surplus hydro power or from off-peak steam power from the company's other plants.

The general contract has been given to the U.G.I. Contracting Company of Philadelphia and construction will start immediately. The plant will be used primarily for peak-load carrying purposes and is expected to go into operation in the summer of 1928, according to a statement to the ELECTRICAL WORLD by Irvin W. Day, vice-president of the Connecticut Light & Power Company.

Municipal Ownership Defeated on Home Grounds

Citizens of Newton, Kan., on the clear-cut issue of municipal or private ownership, voted July 13 to grant the Kansas Gas & Electric company, Wichita, a twenty-year franchise. The election, which attracted state-wide interest, carried by a majority of 272.

Newton, one of the more important cities served by the Kansas Gas & Electric, is the home of Harry C. Bowman, president of the League of Kansas Municipalities, an organization devoted to the advocacy of municipal ownership. Mr. Bowman, who is also city attorney of Newton, led the fight against the granting of a franchise. The franchise under which the company now operates will expire next year.

The Newton election was perhaps the most warmly contested matter of its kind to be determined by a city of Kansas for several years. It was looked upon as a test of strength for the protagonists of municipal ownership and as such enlisted widespread interest. Newton's rates are among the lowest in the state and no dissatisfaction was voiced with respect to rates or character of service, the issue centering entirely on the question of private or public enterprice.

Alabama Power Stock Goes Rapidly

Between the first and eighteenth of July the people of Alabama have invested $1,400,000 in the preferred stock of the Alabama Power Company, according to an announcement made by Tom Bragg, head of the investment department of the company. Moreover, a large proportion of the buyers have not been solicited by salesmen, but have mailed their requests for the stock in to the investment department of their own accord. Mr. Bragg attributes this fact in part to the publicity of the daily and weekly papers throughout the state and in part to the growing feeling of good will and esteem that the people of Alabama are daily showing for the Alabama Power Company.

The sales record for the two weeks mentioned above shows that during that period the investment department sold 4½ times as much stock as was sold during the year 1920 and 3½ times as much as was sold during the year 1921. This new series, preferred stock at $90 a share, and which pays $6 a year dividend, was announced on July 1, and since that time the investment department has been doing the land office business described above.

Louisville Hydro Project Going Forward

Work on the new $9,000,000 dam and power plant of the Louisville Hydro-Electric Company, on the Falls of the Ohio River, directly in front of Louisville, is progressing rapidly, there having been a little delay and layoff of men on account of a rise in the river a few days ago, but the river has returned to a normal stage following heavy rains to the east. Work is going ahead on a three eight-hour shift basis to take advantage of the low river over the summer period.

CONSTRUCTION PROGRESS VIEW OF LOUISVILLE HYDRO PROJECT

R. G. Butler, superintendent of construction Louisville Gas & Electric Company, of which the Louisville Hydro-Electric Company is a subsidiary, both being controlled by the Byllesby interests, talking before the Optimists Club, Louisville, on July 13, held that Louisville would have the seventh largest hydro-electric plant in the country, with an ultimate capacity of 135,000 hp. A dam 8,650 ft. long, constructed under the direction of the federal government, is part of the project. In connection with the hydro plant plans have been made for a steam plant with an ultimate capacity of 250,000 hp. In the local construction the river will be made much safer for navigation and the falls will be eliminated.

Briefer News

Would Sell Municipal Plant. — The City Council of Danville, Va., has decided to recommend to the people the sale of the municipally owned electric plant and gas works to the Appalachian Power Company for $2,750,000. This is conditioned on the working out of an equitable rate structure and an agreement on the length of the franchise.

N.E.L.A. Program of National Advertising.—At the request of the executive committee of the Commercial National Section, N.E.L.A., representatives of manufacturers of household appliances met at Atlantic City recently and discussed the national advertising campaign to fulfill their part of the concurrent advertising plan. It was then agreed that the following campaigns shall be conducted: Sept. 15-Oct. 15, heaters; Oct. 15-Dec. 25, general gift line; February, 1927, waffle irons; March, 1927, toasters; April, 1927, percolators.

Where Electric Service Precedes Water Supply.—An official notification recently appeared in the daily press of Sydney, Australia, to the effect that the council of the shire of Sutherland, New South Wales, prohibits the use of lead-covered wiring for electrical installations and will refuse to connect any premises wired with lead-covered cables. The reason given for the prohibition is that rats may gnaw through the lead casing and uncover the conductors. At present Sutherland has no water supply, and therefore there is no guarantee of efficient grounding.

Control of Black River (Mo.) Hydro Project Changes.—W. H. Meredith of Poplar Bluff, Mo., has turned over the affairs of the proposed dam on the Black River, 40 miles above Poplar Bluffs, for which he holds a preliminary permit, to I. R. Kelso of St. Louis, who is a director of the Community Light & Power Company. If the preliminary plans for the dam and hydro-electric plant are followed, a lake 16 miles long and from 1 mile to 4 miles wide will be formed. The Black River Power & Development Company was organized by Mr. Meredith to develop the project, of which the cost has been estimated at $3,500,000.

American Engineering Council to Seek Solution of Broadcasting Problem.—A "public service solution" of the broadcasting problem is sought by the American Engineering Council, according to an announcement by the council's president. Dean Dexter S. Kimball of Cornell. An investigating committee of engineers will be named by the council to examine the whole situation in an unbiased, broad-minded and comprehensive way, seeking the co-operation of every interest concerned and the aid of the Department of Commerce.

Effort to Extend Powers of Colorado Commission.—Repeated denials by the Colorado courts of power on the part of the Public Utilities Commission to regulate utility affairs in "home rule" cities has led to the filing of a petition with nearly 60,000 signatures asking that at the next election a charter amendment be placed upon the ballot which would give the commission jurisdiction over every public utility in the State of Colorado with the exception of those municipally owned. The number of signatures was more than twice as many as were needed under the law.

Athens, Ala., Buys Lakeland's Too Small Plant.—The city of Athens, Ala., which has a municipal plant, recently purchased from Lakeland, Fla., the generating equipment installed by the latter city when the boom first started. The municipal authorities of Lakeland failed to gage correctly the growth of business, and in a few months the plant became inadequate to supply the Florida city and was put on the bargain counter, though almost new.

Niobrara River Dam Under Way.—The Northern Nebraska Power Company is pushing the construction of its hydro-electric dam across the Niobrara River. Eight months will be needed to complete it. The concrete portion upon which the power house will rest will be 550 ft. long and the dirt part 3,200 ft. long, 120 ft. wide at the base and 20 ft. high. The plant is expected to develop 3,300 hp. and to supply communities in northern Nebraska and southern South Dakota for a radius of 75 miles.

Coming Meetings of Electrical and Allied Societies

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see ELECTRICAL WORLD, July 3, page 50.]

Association of Electragists International—Hotel Breakers, Cedar Point, Ohio, Aug. 24-27. L. W. Davis, 15 West 37th St., New York.

Camp Co-operation VI (local leagues)—Association Island, Henderson Harbor, N. Y., Sept. 1-4. (Society for Electrical Development, New York, is sponsor.)

Wisconsin Utilities Association, Electric Section—Eau Claire, Wis., Sept. 3 and 4. J. N. Cadby, 445 Washington Bldg., Madison, Wis.

Illuminating Engineering Society—Essex and Sussex Hotel, Spring Lake, N. J., Sept. 7-10. L. H. Graves, 31 West 46th St., New York.

Rocky Mountain Division, N. E. L. A.—Glenwood Springs, Col., Sept. 13-16. O. A. Weller, Public Service Co., Denver.

New England Division, N. E. L. A.—Poland Spring House, Poland, Me., Sept. 21-23. Miss O. A. Bursiel, 149 Tremont St., Boston.

International Association of Municipal Electricians — Battery Park Hotel, Asheville, N. C., Sept. 21-24. E. H. Benz, West New York, N. J.

Great Lakes Division, N. E. L. A.—French Lick, Ind., Sept. 23-25. R. V. Prather, 205 Illinois Mine Workers' Bldg., Springfield, Ill.

Association of Edison Illuminating Companies — Chateau Frontenac, Quebec, Sept. 27-Oct. 1. P. S. Millar, 80th St. and East End Ave., New York.

Public Utilities Association of West Virginia—Charleston, W. Va., Oct. 1 and 2, A Bliss McCrum, secretary.

Empire State Gas and Electric Association—Lake Placid Club, N. Y., Oct. 4 and 5. C. H. B. Chapin, Grand Central Terminal, New York.

American Electric Railway Association—Cleveland, Oct. 4-8. J. W. Welsh, 292 Madison Ave., New York.

American Electrochemical Society—Hotel Washington, Washington, Oct. 7-9. C. G. Fink, Columbia University, New York.

Kansas Section, N. E. L. A.—Manhattan, Kan., Oct. 14-16. H. Lee Jones, 401 National Reserve Bldg., Topeka, Kan.

Progress of Negotiations at Winnipeg, Manitoba.—Negotiations between the city of Winnipeg and the Manitoba Power Company for the purchase from the latter of a block of power over a period of years to take care of the prospective shortage in the output from the municipal plant have been proceeding steadily, with indications that an agreement will be concluded. The latest proposal submitted by the company is that the city should purchase a minimum of 247,000 hp. over a period of eleven years at a cost of $4,578,750, or a maximum of 270,000 hp. at $4,495,000. From the municipality's point of view the chief advantage claimed for the new terms is that they will not load the city with surplus power during the early years of the contract, but will provide power in the latter years, when the shortage is expected to be acute.

Talk of Eighteen 12,500-Hp. Units for Ontario Hydro's Nipigon System.—Within the next few weeks work will start on the hydro-electric development at Alexander's Landing, near Cameron Falls, Ontario, for the Ontario Hydro-Electric Power Commission's Nipigon system. Six units will be installed initially, giving a total output of 75,000 hp. When the second series of six units shall have been completed the total power available from the Nipigon system will be 150,000 hp., by which time it is expected there will be demand for still another six units. A third power site is already being discussed, though the location has not yet been made public.

Guadalupe River Soon to Be Dammed.—The Guadalupe Power Company will, according to its president, F. H. Willmont, soon erect three dams in the Guadalupe River between New Braunfels and Seguin, at a cost of $2,500,000. The power developed will, it is understood, be sold under a thirty-year contract to the Comal Power Company of San Antonio and New Braunfels. The project has been financed, Mr. Willmont says, and work will begin within 90 days.

Spectacular Lighting for "Greater St. Louis" Exposition. — A "Greater St. Louis" Exposition is to be held under the auspices of the city and the St. Louis Chamber of Commerce from Sept. 4 to Sept. 19. Its promoters claim that it will be held in one of the most colorful and picturesque out-of-doors exposition grounds ever constructed. The lighting system will provide an intense concentration of light over the 45-acre site. There will be a battery of "superpower" arc lamps and search lamps and numerous floodlighting installations, in addition to an elaborate system of lighting on the 7 miles of streets. The combined candlepower will exceed 5,-

000,000. The street lamps will be of same design as those used in the city. There will be 300 standards, each carrying two 1,000-cp. lights. The electrical display will be visible, it is expected, within a radius of 30 miles.

Hearings on Expansion. — Hearings on the acquisition of the Syracuse Lighting Company of Syracuse, N. Y., by the Mohawk-Hudson Power Company were begun before the Public Service Commission on July 15. The addition of the Syracuse interests to the Mohawk-Hudson is expected to add a considerable earning to that company, as it is one of the strongest units of its kind in the country. Annual sales of power show that it has grown from 74,420,295 kw.-hr. sold in 1921 to 173,338,675 kw.-hr. sold in 1925, while the net income increased from $962,997 in the year ended Dec. 31, 1923, to $1,319,983 for the year 1925.

Space Already in Demand for December Power Show.—Preliminary plans for the fifth National Exposition of Power and Mechanical Engineering indicate that this show, which is to be held in the Grand Central Palace, New York City, from Dec. 6 to 11, inclusive, will be larger even than last year, when the total number of exhibitors was over 400. Three entire floors of the Palace have already been sold to exhibitors and a portion of the fourth floor. Much space will be given to power-generating equipment. Among the engineers on the advisory board are I. E. Moultrop, chairman, Edison Electric Illuminating Company of Boston; W. L. Abbott, president American Society of Mechanical Engineers; N. A. Carle, C. F. Hirshfeld, E. B. Katte and H. B. Reynolds.

New High-Tension Line to Reach Kingsport, Tenn.—The American Gas & Electric Company is building a 65-mile, 132-kv. double-circuit steel-tower line from Switchback, W. Va., by way of Saltville, Va., to Kingsport, Tenn., where a substation will be erected. The total cost of the transmission line and substation is put at a million dollars.

Rochester to Improve Its Street-Lighting System.—Plans are on foot to make Main Street East, Rochester, N. Y., one of the best-lighted streets in the country. The work, which had its inception in the East Main Street Improvement Association, is expected to be carried along with the widening of the street. According to Thomas H. Yawger, superintendent of the electrical department of the Rochester Gas & Electric Corporation, the newest type of 1,400-cp. lamps, mounted in pairs on ornamental steel standards, and fed from underground conduits, will be used. The standards will be staggered, and each will be 16½ ft. high.

Great Western Power Wins Suit Growing Out of Fire.—A suit for $619,000 brought by Balfour, Guthrie & Company against the Great Western Power Company has been decided in favor of the defendant, after twelve weeks consumed in the taking of evidence before the Superior Court in Oakland, Cal. The suit arose out of a fire at Port Costa in September, 1924, in which a quantity of grain, hay and feed belonging to Balfour, Guthrie & Company, in warehouses there, was destroyed. The company charged that the fire was caused by transformers belonging to the Great Western Power Company. A previous trial resulted in disagreement of the jury. Another suit in which the grain dealers claimed $224,000 for damage to buildings may now be dropped.

Chattanooga's First Generator on Display.—In connection with the showing in Chattanooga of a motion picture, "Lights of Old Broadway," the Tennessee Electric Power Company placed on display in the theater lobby the first generator to provide electric lighting in that city. The plot of the picture was concerned with the first electric lights in New York City, and this enabled the power company to give the citizens a few historical facts regarding Chattanooga's initial lighting system. The generator displayed was operated for the first time on the night of May 6, 1882, and provided energy for 35 street lamps of the carbon-arc type. A card attached to the machine informed the theatergoers that the electric demand in Chattanooga has increased more than one thousand times since 1882. As the scenario involved the purchase of stock in an electric light company and its subsequent rise in value, the Tennessee company also took advantage of the opportunity to advertise its customer-ownership policy in connection with the picture.

Empire State Association Executives for Better Highway Lighting.—At a meeting of the executive committee of the Empire State Gas and Electric Association at Rochester recently uniform traffic signals for all the cities and villages of the state were advocated. Highway lighting was another question that was discussed at some length. On this subject E. C. Scobell of Rochester, president of the association, said: "We believe that all main highways in the state should be lighted in order to insure greater safety not only to motorists but to persons who use the highways to walk over during the night time. There are no walks at the side of the state highways, and the pedestrian who is forced to proceed along these arteries of traffic at night is in constant danger. If the highways were lighted, it would be possible to send much of the commercial traffic over the highways during the night time. This would save congestion during the day. Many state highways are at present lighted, but the time will come when all of them will be illuminated. We have, of course, a selfish interest in this matter, but on the other hand, being public utilities, we are striving to give the best sort of service to our patrons and to the public in general."

To Limit Rifle Practice.—The Michigan Department of Conservation has decided to assist the power companies in this state in minimizing the serious damage done every year during the hunting season by the practice of shooting at insulators on transmission lines. The forthcoming pamphlet containing the state's fishing and game laws, published by the department, will contain the following message, prominently displayed: "Never shoot at an electric power line. An insulator damaged by a bullet menaces life and property, causes fires and interrupts service upon which thousands depend." Michigan has almost 4,700 miles of transmission systems which convey power from the northern rivers to the southern cities. Every year there is heavy loss and inconvenience to cities dependent upon continuous service as the result of this practice. The action of the department is in response to a suggestion from the Michigan Committee on Public Utility Information, Ann Arbor.

Automatic Feature of Chimney Rock Scheme in North Carolina.—All construction risks in the confined hydro-electric and pleasure-resort project on Lake Lure, at Chimney Rock, in the western part of North Carolina, have been surmounted, according to the engineers, and two-thirds of the work is now completed. As previously reported, the power plant will be controlled automatically from the Turner Shoals station of the Blue Ridge Power Company, 6 miles distant. By means of float switches the level of the lake will determine the operation of the power units, which will consist in the first instance of two, one rated at 1,750 hp. and the other at 3,500 hp. The turbines are already installed. A third unit, rated at 3,500 hp., will be installed later. When the water level drops 3 in. from the normal 104-ft. head the smaller turbine will cease operation, and a further drop of 3 in. will stop the larger one. Under normal weather conditions, however, the two units installed should produce at least 13,500,000 kw.-hr. a year, which the new pleasure resort is expected before long to absorb. The power will be sold to the Blue Ridge Power Company for distribution over an 11,000-volt line. Ample protection against floods is provided.

Men of the Industry

J. T. Barron Appointed to New Position

Jacob T. Barron, formerly general superintendent of generation of the Public Service Electric & Gas Company, Newark, N. J., has been appointed general manager of the electric department, a new position. Mr. Barron has been associated with the Public Service Company since 1907. At first he was connected with the laboratory and construction department and later became chief operator of substations and generating stations in the central division. Subsequently he was appointed superintendent of the central division. His next promotion was to the position of general superintendent of generation.

J. T. BARRON

A graduate of the University of South Carolina, Mr. Barron was for two years identified with the testing department of the General Electric Company before entering the central-station field. He is a member of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers.

John H. McGill, formerly connected with the Narragansett Electric Lighting Company, Providence, R. I., has been appointed senior engineer with the Duquesne Light Company of Pittsburgh. Mr. McGill has been associated with the Narragansett Electric for the past ten years.

Marion Penn, formerly chief engineer of the Kearny plant of the Public Service Electric & Gas Company, Newark, N. J., has been appointed general superintendent of generation to succeed Jacob T. Barron, who has been appointed general manager of the electric department.

T. C. Capistron, formerly supervisor of substations for the New England Power Company, Worcester, Mass., has been appointed manager of the Grafton County Electric Light & Power Company, Lebanon, N. H. Mr. Capistron has been connected with the New England Power System since 1916, when he became substation operator at the Pawtucket, R. I., station. Later he was transferred to Millbury, Mass., and in the fall of 1924 he assumed the duties of the office from which he has just been promoted.

John W. Gunderson, for many years division superintendent of the Aurora, Elgin & Fox River Electric Company in Elgin, Ill., has been appointed general manager of the company to succeed J. F. Egolf, recently appointed assistant to the vice-president of the Chicago Rapid Transit Company. **J. C. Johnson** has been appointed general superintendent of the company. Mr. Johnson was for several years division superintendent in Aurora and under the new plan will be superintendent of both branches.

Hubbard M. Louden has been appointed supervisor of substations for the New England Power Company, Worcester, Mass., to succeed T. C. Capistron, who was recently promoted to the managership of the Grafton County Electric Light & Power Company. Mr. Louden entered the employ of the New England Power system seven years ago and during his service with the organization has had experience in construction, operating and maintenance work. Just prior to his new appointment he was connected with the Fitchburg maintenance force.

J. P. Pope Heads East Central N.E.L.A. Division

John P. Pope, who was elected president of the East Central Division of the National Electric Light Association at the meeting in Cedar Point, Ohio, as announced in the July 24 issue of the ELECTRICAL WORLD, is vice-president and general manager of the combined public utility properties at Lexington, Ky., including the Lexington Utilities Company, the Kentucky Traction & Terminal Company, the Lexington Ice Company and the Kentucky Coach Company. His association with the properties at Lexington dates back to 1906, when he became electrical engineer upon the formation of the Lexington & Interurban Railway, controlling the lighting and power properties and the ice and gas systems in Lexington, and the street railways in Lexington and Frankfort. In 1920 Mr. Pope was made general manager of the Kentucky properties controlled by the Kentucky Securities Corporation, which succeeded the Lexington & Interurban Railway, at which time the present electrical properties also came into existence. It was during the current year that Mr. Pope was promoted to the office of vice-president and general manager of the combined properties.

He entered upon his career in the electrical industry as an employee of the Thomson-Houston Electric Company, engaging in central-station work at the factory in Lynn, Mass., and in the Boston office. Subsequent affiliations included the Gloucester Electric Light & Power Company, Boston, the New Orleans Electric Light & Power Company and its successor, the Edison Electric Illuminating Company of New Orleans, the Virginia Electric Railway & Development Company. Mr. Pope is a native of Boston, Mass., and was educated at Cornell University.

W. B. S. Winans New Chairman of Accounting Section

William B. S. Winans, who has been appointed chairman of the accounting national section of the National Electric Light Association, as announced recently in the ELECTRICAL WORLD, has been connected with the New York office of Henry L. Doherty & Company since 1911. Mr. Winans was born at Nutley, N. J., in 1885 and was educated at the high school in that city and at New York University, from which institution he was graduated in 1906 with the degree of B.C.S. His early business experience was varied, including building,

W. B. S. WINANS

printing, leather and rug manufacturing, but in recent years he has concentrated on public accounting and public utility operation. At the present time he is serving in the capacity of assistant general auditor of the Doherty organization.

G. A. Lemm of Elyria, Ohio, has been made sales manager of the Peoples Gas & Electric Company of Oswego, N. Y., which is controlled by the Carlisle interests. He will have charge of the sales of gas and electrical equipment.

James Stevenson, general superintendent of the Kewanee (Ill.) Public Service Company, has resigned his position, effective Aug. 1. Mr. Stevenson has been associated with the Kewanee utility since December, 1924. Prior to his association at Kewanee he was general manager for the Monmouth (Ill.) Public Service Company and had been in charge of local properties of the Illinois Power & Light Corporation a number of years.

Ernest Wooler, chief engineer of the Timken Roller Bearing Company, Canton, Ohio, sailed for Europe July 14 aboard the Cunard liner *Berengaria.* Mr. Wooler is an Englishman by birth and during his stay in his native land he plans to investigate the development of anti-friction bearings in all industries, including automotive, industrial and transportation. He will inspect the

British Timken plant at Common Lane, Ward End, Birmingham.

Charles H. Hammond has been appointed assistant to the general sales manager of the Georgia Railway & Power Company, Atlanta, according to an announcement made by Charles A. Collier, general sales manager. Mr. Hammond was at one time connected with this company as power sales engineer, but for the past five years has served as a captain in the Corps of Engineers of the United States Army.

Wilbur S. Cooper, formerly instructor of heat-power in the mechanical engineering department of Cornell University, is now assistant engineer in the bureau of research and test of the Brooklyn Edison Company.

Malcolm McIlroy has recently joined the staff of the Central Hudson Gas & Electric Company, Poughkeepsie, N. Y., as assistant distribution engineer. A graduate of Cornell University, Mr. McIlroy spent a year and a half with the General Electric Company, taking up the various test courses.

Prof. Clarence Victor Christie, associate professor of electrical engineering at McGill University, Montreal, has succeeded the late Prof. L. A. Herdt as Macdonald professor of electrical engineering and head of the department of electrical engineering at McGill. Professor Christie holds many important offices and is the author of notable scientific writings. He is at present vice-chairman of the Montreal branch of the Engineering Institute of Canada, chairman of the engineering section of the Canadian Electrical Association, member of the inductive co-ordination committee of the Canadian Electric Association, member of the associate committee of physics and engineering physics of the National Research Council of Canada. In 1917 Professor Christie, in addition to his duties at the university, joined the staff of the Shawinigan Water & Power Company as consulting engineer.

Obituary

Col. H. Martin Brown, a director of the Narragansett Electric Lighting Company, Providence, R. I., since 1902, died at his home in Providence June 9. Colonel Brown had a remarkable career, playing a conspicuous part in the business, manufacturing, banking and political affairs of the state for nearly fifty years. As a director of the Narragansett company he took a keen interest in its activities.

Washington A. Roebling, president and director of John A. Roebling's Sons Company, manufacturer of iron and steel wire and wire rope, Trenton, N. J., died July 21 in that city. The building of the Brooklyn Bridge gave the name of Roebling world-wide fame. The work was undertaken by his father, but his death in 1869, before the building had been begun, left the entire construction in Washington's hands and he directed it to completion. Mr. Roebling was born in Saxonburg, Pa., and was graduated from the Rensselaer Polytechnic Institute in 1857.

James M. Graves

James M. Graves, vice-president and general manager of the Duquesne Light Company, Pittsburgh, died suddenly of apoplexy July 23. He had just returned by automobile from a business trip to New York and was apparently in the best of health. A native of Lexington, Ky., and a graduate of the University of Kentucky, Mr. Graves served a short time with Field & Hinchman, consulting engineers of Detroit, before removing to Pittsburgh, where he became associated with the Heyl & Patterson Company. In 1903 he became assistant to W. A. Shoreman, general engineer of the Allegheny Light Company, and later was made assistant superintendent of power stations of the Duquesne Light Company. In 1906 he was advanced to be superintendent of power stations. In his capacity as assistant general manager, to which he was appointed July 1, 1920, and as general manager and more recently vice-president and general manager Mr. Graves brought to his work a vision of a constantly growing better service to the general public which the company serves.

J. M. GRAVES

Mr. Graves had for many years been active in furthering the interests of the electrical industry and for more than ten years was a member of the prime movers committee of the National Electric Light Association, which committee had much to do with the rapid development of the generation of power by electricity. He was instrumental in developing many of the practices inaugurated at the great Colfax plant which have made it one of the most efficient steam generating plants in the country. He was also responsible in a large measure for the development of the high-tension transmission ring which surrounds the Pittsburgh district and by means of which the various plants and substations are interconnected to prevent interruptions to service.

George H. Lathrop, electrical contractor, died at his home in Rochester, N. Y., July 20.

Carl R. Fish, widely known in northern New England electrical circles because of his early connection with the jobbing industry, died recently at his home in Cambridge, Mass. For many years he was a supply salesman in New Hampshire and Vermont for the then Boston house of Stuart-Howland. Later he was engaged in public utility engineering in Santo Domingo, and for a time was chief engineer of the North Adams (Mass.) Gas Light Company.

Julian Harvey, technical engineer of the Connors Creek plant of the Detroit Edison Company, died June 30 as the result of a fall through a skylight on the boiler room roof. A graduate of Cornell University, Mr. Harvey had been associated with the Detroit utility for the past seven years.

Ralph E. Porter, electrical engineer, died July 2 in the plant of the General Electric Company at Schenectady, N. Y., as the result of an accident. Mr. Porter entered the employ of the General Electric Company at Schenectady immediately after graduation from the University of Missouri in June. He had been there only two weeks when through an accidental fall he came in contact with a 1,250-volt collector ring of an induction motor. Mr. Porter was a son of J. F. Porter, formerly head of the Tri-City Railway & Light Company and at the present time president of the Kansas City Power & Light Company and a director of the United Light & Power Company.

Robert Todd Lincoln, son of Abraham Lincoln, and at one time first vice-president of the Commonwealth Edison Company, died July 26 at his summer home in Manchester, Vt., in his 82d year. Although he was prominent in public life in his early years, he relinquished a political career to devote his time to corporation law and finance. His public service included four years as Secretary of War under Presidents Garfield and Arthur and four years as minister to Great Britain under President Harrison. A distinguished lawyer, Mr. Lincoln was the head of the firm of Isham, Lincoln & Beale, attorneys for the Commonwealth Edison Company and associated interests. For many years he served as president of the Pullman Company, subsequently becoming chairman of the board. Mr. Lincoln was born at Springfield, Ill., Aug. 1, 1843, and attended the Harvard Law School.

James W. McCrosky, for many years a prominent figure in the electrical industry, died recently at Pasadena, Cal., where he had gone to regain his health. From 1902 to 1914 Mr. McCrosky was identified with the J. G. White Company and during this period of service he supervised much of that organization's construction work in South America. After being affiliated as special representative with J. G. White & Company, Ltd., in London, England, he returned to the United States, establishing a private practice as a consulting engineer and expert on public utility financing. He became manager of the foreign trade department of the Bankers Trust Company, New York, from which position he retired in 1924 to attend to personal business and investments. Mr. McCrosky was born in Industry, Ill., and was educated at the University of Nebraska and at Johns Hopkins University. He was a fellow of the A.I.E.E. and a member of the Engineers' Club of New York.

Recent Court Decisions

Electric Company's Duty in Maintaining Movable Meter Box Securely.—The Court of Appeals of New York, in Loktich vs. Bethlehem Engineering Corporation and New York Edison Company, a suit for damages by a workman on whom a heavy meter box belonging to the electric company fell, owing to insecure fastenings, reversed a verdict for the plaintiff against the electric company, holding that there was no evidence that this company had negligently placed the box in the position from which it fell or that it was under duty to send an agent to see whether the position of the box had become unsafe during construction. The company was not negligent in failing to keep watch on the contractors, and the danger was of a kind apparent to any person working on the job and no special knowledge of electricity would be required to circumvent or evade that danger. (152 N. E. 253.)*

Owners of Millrace Cannot by Abandoning Estate in Land Escape Obligation of Covenants.—The Supreme Court of Ohio has sustained the Court of Appeals in reversing a verdict for the defendant in Quaker Oats Company vs. Northern Ohio Traction & Light Company. The suit was instituted to recover from the utility company a sum spent in repairing and maintaining a millrace on the Little Cuyahoga River under covenants contained in a conveyance from the plaintiff to the defendant by which the latter bound itself to maintain an uninterrupted flow of water through the millrace, the mill-owning company having the right, in the event of the utility company failing to observe this covenant, to enter upon the millrace itself, make repairs and collect the cost from the owner of the race. The utility company, the said owner, had sought to abandon the grant, on the ground that it was only an easement and that the millrace had proved unsuited to its purpose of electrical construction. The Supreme Court held that the transaction had conveyed an estate in land which could not be abandoned without the consent of the grantor and that the obligations as set forth in the covenant must be held binding on the grantee. (152 N. E. 5.)

Contributory Negligence of Radio Owner in Making Dangerous Installation Is Question for Jury.—Kessler vs. West Missouri Power Company was a suit for damages because of the death of the owner of a radio set the antenna of which became heavily charged through contact with a wire belonging to the company. It was shown that the plaintiff's ground wire was 13 in. from the company's wires and that a heavy sleet storm caused the latter to sag and make contact with the ground wire. Whether the defendant company could reasonably have anticipated the erection of such an aërial, whether the defendant had adequately performed its duty of insulating and inspecting its wires, and whether the plaintiff had been contributorily negligent in the placing of his wire, were all held to be questions for the jury, but, on account of faulty instructions in the trial court, the Kansas City Court of Appeals reversed a judgment for the plaintiff and remanded the case for rehearing. (283 S. W. 705.)

That Live Wire Has Fallen in Street Is Prima-Facie Evidence of Negligence.—In Wright vs. J. A. Richards & Company, a suit for damages because of the death of a pedestrian who came into contact with an electric wire belonging to defendants which had fallen to the ground, the jury rendered a verdict for the defendant, alleged to have been due partly to the refusal of the trial judge to charge that the man killed had the right "to go, or walk, or be upon any part of the sidewalk or roadway that he saw fit." The fatality was said to have been due to the man's stepping or falling into a ditch where the wire hung or lay. The Supreme Court of Alabama has reversed the finding, asserting that the man was "entitled to use any portion of the street so far as concerned those maintaining overhead wires," that he was not chargeable with negligence merely because he left the sidewalk, though if he saw the wire or knew it was down it was incumbent on him to avoid it. The court held the fact that a live wire had fallen in the street to be prima-facie evidence of negligence by the owner and the matter of contributory negligence on the part of the victim was for the jury to decide. (108 So. 610.)

Landowner Building on Power Company's Right-of-Way Not a Trespasser.—A workman having been injured by coming in close proximity to 11,000-volt wires which cleared the peak of a building on the roof of which he was working by about 3 ft. sued the company owning the wires for damages (Anderson vs. Southern California Edison Company). The building had been erected on what the company claimed (though this was disputed) was an easement of right-of-way, and the company asserted that the workman was a trespasser. Upholding a verdict for the plaintiff, the California District Court of Appeal said: "Giving the evidence the full force contended for, it shows at most a right for maintenance of an aërial power line supported by poles resting in the ground and does not affect the right of the owner to the surface use of the land except in so far as such surface is reasonably necessary for the purposes of ingress or egress and for maintenance and repair. There is no evidence in the record to show that the presence of the building in any manner restricted or limited defendant's alleged easement or that the company ever objected to its erection or maintenance. On the contrary, they had arranged for the use of higher poles to remove the dangerous condition. So long, therefore, as the structure did not interfere with defendant's alleged interest, it could not complain of its existence, and the owner of the land and those deraigning interest through him had the right to enjoy the full benefit of the improvement, and in thus enjoying it they could in no manner be considered trespassers or mere licensees as to the company. In the enjoyment of its asserted interest it was the duty of the defendant to keep within its limited interest and so to erect its aërial right-of-way as not to interfere with the reasonable use of the surface of the soil to which the owner had made avail. In failing to do so it became itself a trespasser on the rights of the owner and those claiming under him." The failure of the electric power company to raise the wires so high above the roof that those having occasion to go there would not come in contact with them was, the court held, sufficient proof of negligence, and the workman's alleged contributory negligence was for the jury to pass upon. (246 Pac. 559.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Commission Rulings

Commission Cannot Compel Abandonment of Generating Plant on Plea that Lower Rates Would Result.—The Montana Railroad and Public Service Commission has held that it has no power to require the Northwestern Improvement Company, which furnishes electrical service, to abandon a steam plant for generating electricity and connect with and purchase from a transmission line, on a representation by city consumers that lower rates would result therefrom and that the company had connected with the transmission line to secure more energy for peak-load requirements in its non-utility mining operation. The commission said: "Of course, if the connection with the Montana Power Company were used for the city distribution, the investment in boilers and generators and allied plant equipment would be cut down materially and rates would be lower than at present. We have given careful consideration to our authority to require the Northwestern Improvement Company to abandon its steam plant and connect with the Montana Power Company for the Red Lodge service. We are convinced that the Legislature has never invested us with such power, and bearing in mind the strictness with which the courts limit our jurisdiction we do not feel free to indulge in implications when the statute furnishes no basis for them. Even if we had such authority, provision would have to be made for amortizing the value of the plant devoted to the Red Lodge service. Undoubtedly, the distribution system could be used in its present condition, but any solution of the problem that failed to reimburse the Northwestern Improvement Company for its outlay in the plant would be simple confiscation."

Financial and Corporate

Utility Market Irregular

Gains and Losses Appear in About Equal Number in Week of Moderate Trading

MARKET movements in the power and light stocks were mixed during the week ended July 27 just as they were in the industrial and railroad lists. Money conditions remain easy, but the feeling is growing that firmer rates may be expected for the autumn months. This and the fact that sharp advances already have occurred in the last two months in numerous sections of the market had an effect in reducing the trading activity and stimulating profit taking.

On the New York Stock Exchange American Water Works & Electric declined four points during the week under review and in the over-the-counter market Washington Railway preferred fell five and United Gas Improvement fell 4¾ points. A five-point advance for the week was registered, on the other hand, both by Duke Power and Columbus Electric & Power.

Among the issues that lost approximately a point were Commonwealth Edison, National Public Service participating certificates, Kentucky Securities, Electric Bond & Share Securities, Electric Investors, Inc., and Northern States Power A stock. Small gains were made by Arizona Power preferred and American Gas & Electric.

New Capital Issues

The second step in the financing of the power development on the Gatineau River, Que., was taken last Monday, when an offering of 6 per cent sinking fund gold debentures of the Gatineau Power Company was made, a piece of financing involving a total of $12,500,000. These gold debentures, dated June 15, 1926, and maturing June 15, 1941, were priced at 99½ and accrued interest to yield 6.05 per cent. It will be recalled that last week the Gatineau Power Company entered the market with an issue of first mortgage gold bonds totaling $25,000,000.

Another sizable offering of the week was made by the Central Power & Light Company in the form of first mortgage 5 per cent gold bonds, 1956 series, totaling $14,500,000, the price being 96 and interest, yielding over 5.25 per cent.

An additional issue of first and refunding mortgage 4½ per cent sinking fund gold bonds, series C, of the Connecticut Light & Power Company, amounting to $8,000,000, was offered at 95¼ and accrued interest, yielding about 4.80 per cent. The first and refunding mortgage bonds are secured by a first mortgage on the new hydro-electric development now under construction on the Rocky River, on the existing hydro-electric plant at Stevenson on the Housatonic River and the large steam-electric plant at Devon on tidewater, which together will have an installed generating capacity of 145,000 hp.; 146 miles of transmission lines and valuable undeveloped water powers, and by a second mortgage, subject to $1,000,000 divisional bonds, on the company's third hydro-electric plant (9,600 hp.) and 25 miles of transmission lines. They are also a first lien on a 999-year lease of the electric distributing systems in Waterbury, New Britain and a number of other towns.

The General Public Utilities Company issued 18,240 shares of $7 cumulative preferred stock, the price being 96 and accrued dividends. The company, incorporated under the laws of Florida, operates a group of electric, ice and water properties in 68 rapidly growing cities and towns located in Louisiana, Texas, New Mexico, Arizona, Nebraska, South Dakota and Florida.

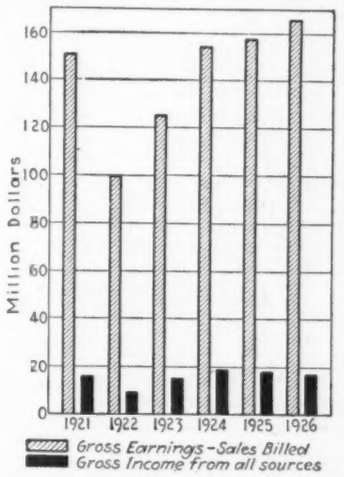
Cumulative preferred stock of the Virginia Public Service Company, 7 per cent series, was offered to the amount of $1,600,000. The Virginia company is a subsidiary of the National Public Service Corporation.

Westinghouse Shares in Electric Growth

Common Dividends Have Been Paid Regularly Since 1912—Is Second Largest Manufacturer of Electrical Equipment in Country

BY PAUL WILLARD GARRETT
Financial Editor *New York Evening Post*

ORGANIZED originally in 1872, the Westinghouse Electric & Manufacturing Company gradually has built up its business until gross sales for the fiscal year ended March 31, 1926, at $166,006,801, reached a new high in the company's history. It now is the second largest manufacturer of electrical equipment in the country and owns extensive plants at various strategic points. The present high annual rate of gross business compares with a total of only $33,671,485 as recently as 1915, which means that in slightly more than a decade the company has increased its gross earnings about fivefold.



STATEMENT OF EARNINGS OF WESTINGHOUSE COMPANY SINCE 1921
(Year ending March 31)

Net earnings for the fiscal year ended March 31, 1926, failed by a small margin to equal the net for the year before, although, as has been said, gross earnings attained new high levels. Net earnings were $14,122,001, or at the rate of $5.96 a share on the common stock. The present dividend rate on the preferred and common issues calls for an annual expenditure of $9,400,000. To cover this dividend requirement the company for ten years has shown an annual average amount available for such dividends of $14,122,001.

Westinghouse Electric & Manufacturing Company's capital structure is relatively simple, consisting of two issues of bonds and two of stocks. The funded debt consists of a $30,000,000 issue of 7 per cent bonds due May 1, 1931, and a $5,990,000 issue of Westinghouse Machine Company 6s due in 1940. The 7s of 1931 are callable as a whole at par and interest plus a premium equal to one-half of 1 per cent of the principal amount for every six months intervening between the date fixed for redemption and the date of maturity. It has a relatively small issue of 7 per cent ($50 par value) cumulative participating preferred stock, $3,998,700, and after that comes $114,504,450 in common stock. Both the preferred and common shares now get 8 per cent ($4) annually.

Being free from bank loans and having built up a profit and loss surplus of $51,715,396, Westinghouse is in an excellent financial position. All of its securities command a favorable investment rating in the markets.

At the annual meeting of stockholders held June 9, 1926, E. M. Herr, president, said in part: "Business, on the whole, is rather better than was expected and is on the same basis as last year. Our company has maintained a level value and now has a satisfactory load for its facilities. Due to seasonal conditions, we may expect a slight decrease in business during the summer months. Crop conditions in the fall will determine, to a certain degree, business conditions at that time. If crops are small business will

probably be on a lower level, although there will not be a large decrease even under adverse conditions."

German Utility Floats Loan

An interesting offering was made to the investing public on Tuesday last, when the Oberpfalz Electric Power Corporation (Oberpfalzwerke Aktiengesellschaft für Elektrizitätsversorgung, Germany) floated an issue of first mortgage 7 per cent sinking fund gold bonds, amounting to $1,250,000. The Oberpfalz Electric corporation supplies Oberpfalz (Upper Palatinate), a densely populated district in northeastern Bavaria, with electricity for domestic and industrial purposes. This territory has an area of about 3,789 square miles and a population of approximately 629,000. The district of Oberpfalz and the cities and communities served are majority stockholders of the Oberpfalz corporation. Under the terms of its franchises the company has the right to use Bavarian state property for its transmission lines and has the exclusive right with small local exceptions to furnish electric current to the communities served. These bonds, constituting the company's sole funded indebtedness, are unconditionally guaranteed by the General Electric Company, Germany, as to payment of principal, interest and sinking fund by indorsement on each bond and will be the direct obligation of the Oberpfalz Electric Power Corporation. The bonds were dated June 1, 1926, maturing June 1, 1946, and were priced at 97.50 and interest, to yield about 7.25 per cent.

Dividends Declared

The quarterly dividends listed below have been announced by electric light and power and electrical manufacturing companies:

Name of Company	Per Cent	When Payable
Associated Gas & Electric, $6 pf*...	$1.50	Sept. 1
Associated Gas & Elec., $6.50 pf.*.	$1.62½	Sept. 1
Cities Service, com.†.....	½	Aug. 1
Cities Service, com.‡.....	½	Aug. 1
Cities Service, pf. and pf. B†.....	½	Aug. 1
Connecticut Ry. & Ltg., com. & pf.	1½	Aug. 14
Cumberland County Pwr. & Lt., pf	1½	Aug. 2
Ingersoll-Rand, com.....	.75	Sept. 1
Louisville Gas & Elec., com. A & B	.43¾	Sept. 25
Lowell Electric Light.....	.62½	Aug. 2

* Payable in cash or stock at rate of 5.1-100ths of class A stock for each share of $6 dividend stock and 5.5-100ths of class A stock for each share of $6.50 dividend stock.

† Monthly. ‡ Payable in common stock.

General Electric Earnings for First Six Months of 1926

The General Electric Company's net sales billed for the first six months of the current year ended June 30, 1926, totaled $147,450,868 and the profit available for dividends on the common stock and surplus is $19,000,393.

This announcement, which indicates net earnings equivalent to about $2.63 per share on the 7,211,481 shares of new no par value stock, was made by President Gerard Swope in accordance with a new plan of the company for reporting earnings quarterly to the stockholders, in addition to the statement of orders received which has heretofore been sent stockholders every three months.

Standard Gas & Electric Customer-ship Sales.—Customer-ownership sales of preferred stock by the Standard Gas & Electric Company's operated utility properties during the first six months of 1926 totaled $12,038,100 par value. There were 19,113 separate transactions, the average sale approximating $630 par value. This total was slightly less than for the first half of 1925, when customer sales amounted to $12,-

Stock Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday July 27	Low 1926	High 1926
ABITIBI PWR. & PAPER, com. —no par	*k* 74	70¼	84½
Adirondack Pwr. & Lt.—7% pf.....	107	....	....
Adirondack Pwr. & Lt.—8% pf.....	113	....	....
Ala. Pwr., pf.....	105½	....	....
Allis-Chalmers Mfg. pf.....	110	105	110½
Allis-Chalmers Mfg., com.....	88½	78¼	94½
Aluminum Co. of Amer., com....	68	....	....
Aluminum Co. of Amer. new, pf....	101	....	....
Amer. & Foreign Pwr., pf. 25% pd...	*m*108	108	131
Amer. & Foreign Pwr., 7% pf.—no par	90	89	98
Amer. & Foreign Pwr., com.—no par	21	15½	42¾
Amer. Bosch Magneto, com—no par	18½	16	34¾
Amer. Brown, Boveri, Elec.....	39½	30½	48¾
Amer. Brown, Boveri, Elec., pf.....	95½	86½	97½
Amer. Elec. pwr., pf.....	*m*111	102	111
Amer. Gas & Elec., 6% pf.—no par.	93½	....	....
Amer. Gas & Elec., com.—no par...	94½	64	99¼
Amer. Lt. & Trac., 6% pf.....	106½	101	108
Amer. Lt. & Trac., com.....	*k*218	195	264
Amer. Pwr. & Lt., 6% pf.....	96½	92	97
Amer. Pwr. & Lt., com.—no par....	67	45	80
Amer. Pub. Serv., 7% pf.....	*k* 93	92	97½
Amer. Pub. Serv., com.....	50	45	80
Amer. Pub. Utilities, 6% pf.....	85	....	....
Amer. Pub. Utilities, 7% pf.....	92½	....	....
Amer. Pub. Utilities, com.....	79	....	....
Amer. States Sec., A.....	3	....	....
Amer. States Sec. B.....	2½	....	....
Amer. Superpwr., pf.—25	*k* 25¼	23	26¾
Amer. Superpower, pf.....	93	....	....
Amer. Superpwr., Class A—no par..	27½	10½	37¾
Amer. Superpwr., Class B—no par..	29½	21½	39
Amer. Wtr. Wks. & Elec., 7% pf...	106	101½	108½
Amer. Wtr. Wks. & Elec., com.—20.	60	43¾	74
Anaconda Copper.....	50	41½	51
Appalachian Pwr., 7% pf.....	98	98	101
Appalachian Pwr., 1st pf., 7%.....	98	98	101
Appalachian Pwr., com.....	78	77	83
Arizona Pwr., 7% pf.....	70	....	....
Arkansas Cent. Pwr., pf., $7—no par	104	....	....
Arkansas Lt. & Pwr., 7% pf.....	100	....	....
Arkansas Lt. & Pwr., com.....	*k*100	110	115
Asheville Pwr. & Lt., 7% pf.....	*l* 106½	100½	107½
Assoc. G. & E., pf.—$3.50—50	50	....	....
Assoc. Gas & Elec., pf.—$6—no par	84	....	....
Assoc. Gas & Elec., Class A—no par	33	25½	35½
BABCOCK & WILCOX, com......	119	....	....
Birmingham Elec. pf.—$7—no par...	105½	....	....
Blackstone Valley Gas & Elec., pf...	101½	*k*101	106
Blackstone Valley G.&E., com.—50.	*k* 98	....	....
Blaw-Knox, com.....	*i* 60	45	60
Brazilian Trac., Lt. & Pwr., com...	*f*100½	....	....
Broad River Pwr., pf.....	95	....	....
Brooklyn Edison, com.....	*k*141	135	146½
Buffalo, Niagara&East.Pwr.,pf.—25.	24½	....	....
Buffalo, Niagara & Eastern Pwr., com.—no par.....	31½	....	....
CALIFORNIA ELEC. GENERATING, pf......	92	89	95
California Ry. & Pwr., pf.....	100	88	115
Carolina Pwr. & Lt., pf.—$7—no par	106	....	....
Cent. & S. W. Ut. 7% pf.—no par .	*a* 93½	89½	96½
Cent. & S. W. Ut., pr. lo. pf.—no par	*a* 95	93	100
Central Ariz. Lt. & Pwr., pf.....	103	....	....
Central Ark. Ry. & Lt., 7% pf.....	*k* 98	99	99½
Central Ill. Pub. Serv., 6% pf.....	*k* 88	89	91
Central Ind. Pwr., 7% pf.....	85	85	93
Central Pwr. & Lt., pf.....	97½	....	....
Central States Elec., 7% pf.....	92	....	....
Central States Elec., com.....	*m*200	200	230
Century Elec., com.....	*b*115	110	116
Chicago Fuse Mfg., com., no par....	*a* 31½	30	35
Cincinnati Gas & Elec., com.....	*g* 89	88	95
Cities Service, 6% pf.....	*l* 86½	82½	86½
Cities Service, pf.B—10.....	*i* 7¼	7¼	7¼
Cities Service, pf. BB—100.....	*l* 74	74	79
Cities Service, com.—20.....	*l* 41½	37½	42½
Cities Service, Bks. Shrs.—10.....	*l* 20½	19½	20½
Clarion River Pwr., pf.....	93	93	95
Cleveland Elec. Illg., 6% pf.....	107½	103	108
Cleveland Elec., Illg., com.....	*k*265	240	270
Colorado Pwr., 7% pf.....	*k* 95	96	97
Columbia Gas & Elec., 7% pf.....	*k*115	112	115½
Columbia Gas & E., com.—no par..	83½	63½	90
Columbia Ry., Gas & Elec., 6% pf..	90	90	97
Columbus Elec. & Pwr., 2d pf.....	103	....	....
Columbus Elec. & Pwr., com.....	255	....	....
Columbus Ry., Pwr. & Lt., 1st pf....	98	....	....
Columbus Ry., Pwr. & Lt., pf. B....	93	....	....
Col. Ry., Pwr. & Lt., com.—no par.	65	....	....
Commonwealth Edison, com.....	*a*136	135½	145
Commonwealth Pwr., 6% pf.....	*k* 86½	82	87½
Commonwealth Pwr., com—no par..	38½	28½	42½
Conn. Lt. & Pwr., 8% pf.....	116	....	....
Conn. Lt. & Pwr., 7% pf.....	108	....	....
Cons. Gas of N. Y., pf.—50.....	59	....	....
Cons. Gas of N.Y., com.—no par...	104½	87	104½
Cons. Gas Elec. Lt. & Pwr. of Balti., 6% pf.....	*k*104	102	105
Cons. Gas, Elec. Lt. & Pwr. of Balti. 6½% pf.....	*e*110½	108½	111½
Cons. Gas, Elec. Lt. & Pwr. of Balti. 7% pf.....	*e*112½	109	113½
Cons. Gas, Elec. Lt. & Pwr. of Balti. 8% pf.....	*e*127	124	128½
Cons. Gas, Elec. Lt. & Pwr. of Balti. com.—no par.....	*e* 51½	45	57½
Cons. Pwr. & Lt., 7% pf.....	104	....	....
Consumers Pwr., 6% pf.....	98	....	....
Consumers Pwr., 6.6% pf.....	104	....	....
Continental Gas & Elec., 7% ptc. pf	101	....	....
Continental Gas & Elec., 7% pr. pf.	96½	....	....
Continental G.&E., com.—no par...	130	....	....
Croker Wheeler, com.....	19	....	....
Croker Wheeler, pf.....	54	....	....
DALLAS PWR. & LT., 7% pf.....	104½	....	....
Dayton Pwr. & Lt., 6% pf.....	100	....	....
Detroit Edison, com.....	135	123½	141½
Dubilier Condenser & Radio, com.— no par.....	5½	4½	11
Dubuque Elec., 6% pf.....	94	92	99
Duquesne Lt., 7% pf.....	115	111½	116½
EAST. N. Y. UTIL. pf......	93	85	94
Eastern New York Util., com.....	65	70	75
Eastern States Power.....	15	....	....
Eastern States Power, pf.....	*k* 87	89	95
Eastern Tex. Elec., 7% pf.....	103	....	....
East. Tex. Elec., com.—no par.....	75	70	80
Edison Elec. Illum. of Boston, com..	*d*229	207	250
E. Paso Elec., com.—no par.....	70	70	90
E. Paso Elec. pf.....	103	....	....
Elec. Bond & Share, 6% pf.....	*l* 108	103½	109½
E. Bd. & Share Sec., com.—no par..	*l* 69½	56½	86
El. Household Util.....	*a* 15	13½	25
Elec. Investors, 6% pf.—no par....	87	....	....
Elec. Investors, com.—no par.....	41½	30½	74½
Elec. Investors, 10% pd. receipts...	21	17	51
Elec. Pwr. & Lt., ctfs, pf.....	96½	89½	97½
Elec. Pwr. & Lt., ctfs., 40% pd.....	104½	99½	115
Elec. Pwr. & Lt., ctfs. full pd.....	*k*105	103	110½
Elec. Pwr. & Lt., ctfs., com—no par.	19½	15½	34½
Elec. Ry. Securities, com.—no par..	68	4½	10
Elec. Refrig.....	72½	62½	78½
Elec. Storage Battery, com.—no par.	82½	71½	86½
Elmira Wtr., Lt. & R. R., 7% pf...	99	97	101
Emerson Elec., pf.....	*b*101½	100	104½
Empire Dist. Elec., 6% pf.....	*l* 88	82	88
Empire Power, A.....	25½	21	32
Engr. Pub. Serv., pf.—no par.....	96	86	96
Engr. Pub. Serv., com.—no par.....	23½	21	29½
Eureka Vac. Cleaner, com.—no par...	54	43	56
FAIRBANKS MORSE, pf......	*k*109	108½	115
Fairbanks Morse, com.—no par....	*k* 50	46	59½
Federal Lt. & Trac., com.....	*k* 30½	28	39½
Federal Light & Traction, pf.....	*k* 86½	86	89
Federal Utilities, pf.....	70	....	....
Federal Utilities, com.....	17	....	....
Ft. Worth Pwr. & Lt., 7% pf.....	*l* 106	105	108½
GALVESTON-HOUSTON ELEC., 6% pf......	43	....	....
Galveston-Hstn. El., com.....	13	....	....
Gen. Elec., com.....	351½	285	386½
Gen. Elec., special—10.....	11	11	11½
Gen. Elec., new.....	87½	79	90½
Gen. G.&E., (Del.) com. A no par..	*k* 37½	34	59
Gen. G.&E., (Del.) com. B no par..	*k* 37½	28	49
Gen. G.&E., (Del.) A pf. $8 no par..	*k*106½	105½	110½
Gen. G.&E., (Del.) A pf. $7 no par..	*k* 97½	95	99½
Gen. G.&E., (Del.) pf. B.....	95½	92½	96
General Public Service, pf.....	*k*104½	90	106½
General Public Service, com.....	*k* 12½	12½	16½
Ga. Lt., Pwr., & Rys., 6% pf.....	95	77	96
Ga. Lt., Pwr. & Rys., com.....	70	65	81
Ga. Ry. & Power, 8% pf.....	113	....	....
Ga. Ry. & Power, 7% pf.....	103½	....	....
Ga. Ry. & Pwr., 4% pf.....	*k*120	105	145
Ga. Ry. & Pwr., com.....	120	....	....
Gt. Western Pwr., 7% pf.....	*h*100½	....	....
HAVANA ELEC. UTIL., com....	*m* 32	28	44½
Havana Elec. Util., pf.....	*m* 75	64½	75
IDAHO PWR., 7% pf......	103	103	106
Ill. No. Utilities, 6% pf.....	*a* 91	90	92
Ill. Pwr. & Lt., 7% pf.....	100	....	....
Ingersoll Rand.....	*k* 91½	80½	104
Int. Combus. Engr., com.—no par	54½	33½	64½
Int. Utilities, class A—no par.....	*k* 31½	31	39
Int. Utilities, class B—no par.....	*m* 5	4½	9½
Interstate Pwr., pf., no par.....	93	....	....
Interstate Pub. Serv., 7% pf.....	98	95	100
Iowa Ry. & Lt., 7% pf.....	96	95	100
JERSEY CENTRAL PWR. & LT., 7% pf......	96½	....	....
Jersey Central Pwr. & Lt., ptc., pf...	109	94	113
Jersey Central Pwr. & Lt., com.— no par.....	*k* 45	45	50
Johns-Manville, com.—no par.....	147½	120	165

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid, low, high. Saturday, July 24. *l*Bid. low. high, Wednesday, July 28. *m*Latest quotations available.

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday July 27	Low 1926	High 1926
KANSAS CITY PWR. & LT., pf.	k110	107½	112½
Kansas Gas & Elec., 7% pf.	l 102½	99	103
Kentucky Hydro-Elec., pf.	a 99½	91½	99½
Kentucky Sec., 6% pf.	80	....	....
Kentucky Sec., com.	98	....	....
Kentucky Utilities, 6% pf.	93	92	96
Keystone Pwr. & Lt. 7% pf.	96½	95	98
LACLEDE GAS LT., com.	k168	146	175½
Lehigh Pwr. Sec., com.—no par.	18½	10	23
Long Island Ltg., 7% pf.	108½	....	....
Long Island Ltg., com.—no par.	121	118	130
Los Angeles Gas & Elec., 6% pf.	98½	....	....
Louisville Gas & Elec., Class. A.	24½	....	....
MANHATTAN ELEC. SUPPLY.	82½	56	87½
Manila Elec., com.—no par.	k 33½	27½	39½
Maytag Mfg., com.	23½	19	24½
Memphis Pwr. & Lt., pf., $7, no par	106	105	108
Metro. Edison, pf.—$6—no par.	93	....	....
Metropolitan Edison, pf., $7, no par.	103	....	....
Metropolitan Edison, com., no par.	45	....	....
Middle West Utilities, 7% pf.	a107½	97½	111½
Middle West Utilities, 7% pr. lien pf.	a116½	106½	123½
Middle West Utilities, com.—no par.	a115	108	134½
Midland Utilities, pr. In. pf.	a102	98	104
Midland Utilities pf. A	a 99	96	99½
Milwaukee Elec. Ry. & Lt., 7% pf.	101	....	....
Milwaukee Elec. Ry. & Lt., 6% pf.	93	....	....
Minn. Pwr. & Lt., 7% pf.	l 103	100	104
Miss. Pwr. & Lt., pf.	105	....	....
Miss. River Pwr., 6% pf.	95	....	....
Miss. River Pwr., com.	60	....	....
Mohawk Hudson Pwr., 1st pf.—$7—no par.	100	....	....
Mohawk Hudson Pwr., 2nd pf.—$7—no par.	96	....	....
Mohawk Hudson Pwr., com.—no par	25½	20½	28½
Montana Pwr., pf.	m117½	112½	119½
Montana Pwr., com.	81	69½	83½
Montreal Pwr., com.	f221	....	....
Mountain States Pwr. pf.	97	....	....
Mountain States Pwr., com.	20	....	....
NASSAU & SUFFLOK, LTG., pf.	97½	....	....
National Carbon, pf.	a126	125	128
National Elec. Pwr., pf.	a 25	92	96½
National Electric Pwr-A.	a 94½	19½	26
Nat. Lt., Ht. & Pwr., com.	24	24	26
National Lt., Ht. & Pwr., 5% pf.	72	70	74
National Pwr. & Lt., pf., $7—no par.	101½	96	102½
National Pwr. & Lt., com.—no par.	22	16½	38½
National Pub. Serv., 7% pf.	93	....	....
National Pub. Serv., ptc. pf.	109	....	....
National Pub. Serv., A com.—no par.	20½	15½	24
National Pub. Serv., B com.—no par.	16½	10	17½
Nebraska Pwr., 7% pf.	l 106½	103	107½
Nevada-Calif., Elec., com.	k 22½	18½	44½
New Brunswick Pwr., pf.	55	50	60
New England Pub. Serv., pr. In. pf.	97	97	100
New England Pub. Serv., pf.	89	88	92
N. J. Pwr. & Lt., 7% pf.	105	105	108
New Orleans Pub. Serv., 7% pf.	101½	100	102
N. Y. & Queens Elec. Lt. & Pwr., 5% pf.	87	....	....
N. Y. Central Elec., 7% pf.	97	97	100
Newport News & Hampton Ry., Gas & Elec., com.	110	98	112
Newport News & Hampton Ry., Gas & Elec., pf.	k110	95	112
Niagara Falls Pwr., 7% pf.—25.	108	110	112
Niagara, Lock. & Ont. Pwr., 7% pf.	k108	110	111½
No. Amer., 6% pf.—50.	k 50½	49	51½
No. Amer., com.—10	52	42	67
No. Amer. Edison pf.—no par.	95½	91½	96½
No. Amer., Lt. & Pwr., pf.	k101	88	104
No. American Utilities, pf., full pd.	m 94½	89	96
No. American Utilities, pf., 25% pd.	m 19	18	27
N.C. Pub. Serv., pf.—$7—no par.	92½	....	....
Northeastern Pwr., com.	19½	17½	36½
No. Indiana Gas & Elec., pf. A.	102	98	103
No. N. Y. Utilities, 7% pf.	104	....	....
No. Ohio Pwr.,	14	11	26½
No. Ohio Trac. & Lt., 6% pf.	80	78	81
No. Ohio Trac. & Lt., 7% pf.	93	88	96
No. Ont. Lt. & Pwr., pf.	83	....	....
No. Ont. Lt. & Pwr., com.	73	45	75
No. States Pwr., 7% pf.	101½	99½	102½
No. States Pwr. com.	103	97	136½
No. Texas Elec., 6% pf.	45	....	....
No Texas Elec., com.	18	....	....
OHIO BRASS, com. B—no par.	74	70	79
Ohio Brass, pf.	100	98	101
Ohio Gas & Elec., 7% pf.	95	94	100
Ohio Pwr., 6% pf.	95	94	97
Ohio Pub. Serv., 6% pf.	l 94	90	96
Ohio Pub. Serv., 7% pf.	l 99	96	100
Ohio River Edison, pf.	101	....	....
Oklahoma Gas & Elec., pf.	97	....	....
PACIFIC GAS & ELEC., 6% pf.	100½	....	....
Pacific Gas & Elec. com.	128½	118	132½
Pacific Pwr. & Lt., 7% pf.	l102	98	102½
Parr Shoals Pwr., 6% pf.	92	90	95
Penn Central Lt. & Pwr., pf.—no par	e 72	71	91
Penn-Ohio Edison, 7% pf.	95½	....	....
Penn-Ohio Elec., 7% pf.	95	93	97
Penn-Ohio Pwr. & Lt., 7% pf.	95	95	99
Penn-Ohio Pwr., & Lt., 8% pf.	107	106	110
Penn Pwr. & Lt.—$7—no par.	l 106½	103	108½
Penn Pub. Serv., 7% pf.	101	98	103
Penn Pub. Serv., 6% pf.	85	85	90
Penn Wtr. & Pwr., com.	e 153	141	171
Phila. Co., 6% pf.—50.	50½	47½	51½
Phila. Co., com.—50.	70½	59½	76½
Phila. Elec., com.—25.	c 47	41½	67½
Pittsburgh Utilities, pf.—10.	k 17	14½	20½
Portland Elec. Pwr., 7% pf.	98½	....	....
Portland Elec. Pwr., 6% pf.	80	....	....
Portland Elec. Pwr., 6% 2nd pf.	74	....	....
Portland Elec. Pwr., com.	34	....	....
Potomac Elec. Pwr., pf.	j108½	....	....
Pwr. Corp. of N.Y., com—no par.	m 79	77½	90½
Pwr. Sec., pf.—no par.	k 10	10	29
Pwr. Sec., com.—no par.	k 4	4	13
Pub. Serv. of N. J., 7% pf.	k108½	103½	109½
Pub. Serv. of N. J., 8% pf.	122	115	122
Pub. Serv. of N. J., com.—no par.	90	72	92½
Pub. Serv. of No. Ill., 6% pf.	a105½	100½	106
Public Serv. of No. Ill., 7% pf.	a114½	112	116½
Pub. Serv. of No. Ill., com.—no par	a133	128½	140
Pub. Serv. of No. Ill., com.	a133	129½	140
Pub. Serv. of Okla., 7% pf.	96	95	100
Pub. Serv. Elec. & Gas, 6% pf.	k103	97	104
Public Service Elec. Pwr., pf.	k111½	106	112½
Puget Sound Pwr. & Lt., 7% pf.	102	....	....
Puget Sound Pwr. & Lt., 6% pf.	83	....	....
Puget Sound Pwr. & Lt., com.	29	....	....
RADIO CORP. OF AM., pf.—50.	48½	44½	48½
Radio Corp. of Amer., com.—no par.	43	32	48½
Republic Ry. & Lt., pf.	106½	....	....
Republic Ry. & Lt., com.	82	....	....
Rochester Gas & Elec., 5% pf.	k 95	80	98
Rochester Gas & Elec., 6% pf.	102½	101	104
Rochester Gas & Elec., 7% pf.	104	103	107
SAN JOAQUIN LT. & PWR., 7% pf.	97	97½	98½
Safety Cable	50½	42½	54½
St. Joseph Ry., Lt., Ht. & Pwr., pf.	67	65	70
Servel Corp.,	22	21½	22½
Sierra Pacific Elec., com.	27	....	....
Sioux City Gas & Elec., 7% pf.	100	....	....
S. E. Pwr. & Lt., pf.—$7—no par.	98½	....	....
Southeastern Pwr. & Lt., ptc. pf.	65½	....	....
S. E. Pwr. & Lt., com.—no par.	k 27½	21½	46½
So. Calif. Edison, 8% pf.—25.	31	32½	33½
So. Calif. Edison, 7% pf.—25.	k 28	27½	28½
So. Calif. Edison, 6% pf.—25.	k 25	24½	25½
So. Calif. Edison, com.	m 32½	30½	33
Southern Cities Utilities, 7% pf.	88	....	....
Southern Cities Utilities, com.	35	....	....
Southwestern Lt. & Pwr., A.	60	....	....
Southwestern Lt. & Pwr., B.	60	....	....
Southwestern Lt. & Pwr., $6 pf.	82	....	....
Southwestern Pwr. & Lt., 7% pf.	101	....	....
Springfield (Mo.) Ry & Lt., 7% pf.	99	97	100
Standard Gas & Elec., 8% pf.	57	53½	57½
Standard Gas & Elec., 7% pf.	102½	....	....
Standard Gas & Elec., com.—no par.	54½	51	69
Standard Pwr. & Lt., 7% pf.	95	....	....
Staten Island Edison, pf.—$6—no par	95	....	....
Superheater, com.—no par.	158	....	....
Syracuse Lighting, 7% pf.	107	105	109
Syracuse Lighting, 8% pf.	115	113	119
Syracuse Lighting, com.	325	260	335
TAMPA ELEC., com.	k 50	48	67
Tenn. Elec. Pwr., 6% pf.	88	....	....
Tenn. Elec. Pwr., 7% pf.	102	....	....
Terre Haute, Ind. & East Trac., pf.	k 20	20	37
Terre Haute, Ind. & East. Trac., com	k 1	1	7
Tex. Pwr. & Lt., 7% pf.	l105½	102	106½
Tide Water Pwr., 8% pf.	103	....	....
Timken Roller Bearing, com—no par	57½	44½	57½
Toledo Edison, 8% pf.	l113	111	113
Toledo Edison, 7% pf.	l102½	101	103
Toledo Edison 6 pf.	l 94	90	95
Toledo Edison, com.	100	....	....
Tri-City Ry. & Lt., 6% pf.	88	86	90
UNITED GAS & ELEC., 6% pf.	95	....	....
United Gas & Elec., com.—no par.	m 57	56	66
United Gas & Elec. (N.J.), 5% pf.	68	....	....
United Gas Impr.—50.	c111½	84½	144½
United Lt. & Pwr., pf.—$4—no par.	50½	44	51
United L. & P. pf.—$6.50—no par.	86	81	91
United Lt. & Pwr., com., A—no par	16½	12½	23
United Lt. & Pwr. com., B—no par	a 20	15	31
Utah Pwr. & Lt., 7% pf.	l102	99	103½
Utica Gas & Elec., 7% pf.	104½	....	....
Utica Gas & Elec., com.	205	....	....
Utilities Pwr., & Lt., 7% pf.	93	....	....
Utilities Pwr. & Lt., com A	29	28½	37
Utilities Pwr. & Lt., com. B—no par.	14½	14	18½
VERMONT HYDRO - ELEC., 7% pf.	95	93	96
Virginia Elec. & Pwr., 7% pf.	104½	102	105
Virginia Pwr., 7% pf.	k108	102	104
Virginian Pwr., com.	73	65	76
WAGNER ELEC., pf.	b 65	65	85
Wagner Elec., com.—no par.	b 18	18	43½
Washington Ry. & Elec., com.	f180	....	....
Washington Ry. & Elec., pf.	f 88½	....	....
Washington Wtr. Pwr., com.	k134	132	137
West Mo. Pwr., 7% pf.	94	....	....
West Penn., 7% pf., temp. ctfs.	m100	95½	101
West Penn, com.	m125	118	130
West Penn Elec., pf.	k 99	95½	100½
West Penn Elec., Class A,	k 96	88½	97
West Penn Pwr. pf.	k110	108	112
West Va. Lt., Ht. & Pwr., 7% pf.	94½	94½	96½
West Va. Utilities, 7% pf.—50.	45	42	50
Western Pwr., 7% pf.	93½	91½	99
Western States Gas & Elec., 7% pf.	93½	....	....
Western States Gas & Elec., com.	16	....	....
Westinghouse El. & Mfg., com—50.	69	65	79½
Weston Elec. Instrument, Class. A.	k 30	27½	32½
Weston Elec. Instrument, com.	18½	13½	19
Wheeling Elec., pf.	96	86	98
Wis. Pwr., Lt. & Ht., 7% pf.	k 90	85	90
Worthington Pump, pf. A	k 68	67½	80
Worthington Pump, pf. B	k 58	53	65
Worthington Pump, com.	k 28	20½	44
YADKIN RIVER PWR., 7% pf.	l106½	102	107½
Yale & Towne, com.—25.	k 67½	60½	69

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid, low, high, Saturday, July 24. *l*Bid, low, high, Wednesday, July 28. *m*Latest quotations available.

190,000. Companies which sold preferred stocks on the customer-ownership plan included the Southern Colorado Power, Louisville Gas & Electric, Northern States Power, Oklahoma Gas & Electric, Western States Gas & Electric, Mountain States Power and Coast Valleys Gas & Electric.

Foreign Bonds Called for Payment.—Certain first mortgage 7 per cent sinking-fund gold bonds, series A, of the Great Consolidated Electric Power Company, Ltd. (Daido Denryoku Kabushiki Kaisha), Japan, have been called for payment Aug. 1 at par and interest. The bonds designated for redemption total $250,000.

Northern New York Company Cuts Directorate.—The board of directors of the Northern New York Utilities, Inc., of Watertown, N. Y., has been cut from 25 members to 21 members, according to papers filed with the Secretary of State in Albany, N. Y., on June 19. Papers changing the par value of the common stock from $25 a share to the same number of shares without any par value were also filed. The change does not affect the preferred stock of the company, which remains at 100,000 shares of $100 par value. The common stock consists of 400,000 shares.

Erie Lighting Issues Additional Shares to Stockholders.—The board of directors of the Erie Lighting Company has issued at $35 per share and accrued dividend 27,204 additional shares of preference stock without par value. The company is offering these additional shares on the following basis: Each stockholder of record July 7, 1926, is entitled to subscribe at the rate of one share for each five shares of preference or common stock held on that date. Subscription privilege expires Aug. 3. The purpose of the issue is to raise funds to discharge certain current liabilities, for the construction requirements of the company and for other corporate purposes.

United Gas Improvement to Pay 25 per Cent Stock Dividend.—Directors of the United Gas Improvement Company recommended to the stockholders of the company a 25 per cent stock dividend, representing a distribution of $20,365,300 of undivided profits, according to an announcement made by Samuel T. Bodine, president. The dividend, if authorized, will be payable Nov. 15 to stockholders of record Oct. 15.

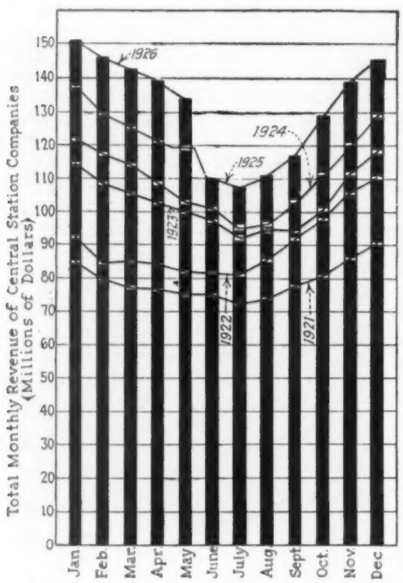
New Servel Stock Listed on Curb.—H. G. Scott, president of the Servel Corporation, in a notice to holders of the certificate of deposit in the recapitalization of the company, stated that the common stock of the Servel Corporation of Delaware, the new company, has been listed on the New York

Curb Market. The class A stock and certificates of deposit of class B shares of the old company, the Servel Corporation of Virginia, are no longer listed.

Commonwealth Edison Rights.—Stockholders of the Commonwealth Edison Company of record July 1 will receive the right to subscribe at par ($100) for additional stock at the ratio of one new share for each eight shares held. Stock may be paid for by Aug. 2 in cash, in four quarterly installments or in ten equal monthly payments.

May Revenue 12.9 per Cent Over Last Year

Reports received by the ELECTRICAL WORLD from central-station systems representing 80 per cent of the generator rating of the industry indicate that



REVENUE SHOWS GAIN OVER LAST YEAR

the total gross revenue from the sale of energy during May was $134,300,000, or a daily average of $4,510,000, an increase of 12.9 per cent over May of last year. During May the gross revenue was 4.1 per cent above the estimated normal for that month, this normal being based on the operations for the past five years.

The operating expenses during May totaled $57,300,000, a gain of 9.5 per cent over May of last year.

Central Power & Light Bonds Listed.—First mortgage 5 per cent gold bonds of the Central Power & Light Company to the amount of $14,500,000 have been authorized to be listed on the Boston Stock Exchange.

Increases in Capital.—At a special general meeting shareholders of the East Kootenay Power Company, Ltd., Fernie, B. C., voted for an increase in the authorized capital. The bylaw which was adopted provided for an increase in the 7 per cent cumulative preferred stock from $750,000 par value to $5,000,000 par value and in the common stock from 30,000 shares of no par value to 50,000 shares of no par value. The directors deemed it advisable to effect this change in set-up in order that the financial structure of the company might permit of the issuance, as and when required, of additional securities for the purpose of financing future capital expenditures. The Bangor Hydro-Electric Company proposes to increase its authorized preferred stock from $5,000,000 to $7,000,000, par $100. Proceeds are to be used to pay for the construction of a proposed hydro-electric project.

Nevada-California Electric Corporation

Total Gross Operating Earnings in 1925 Amounted to $4,874,442—Advantages of Refinancing Plan Announced Last Month

THE combined report of the operations of the Nevada-California Electric Corporation and subsidiary companies for the year ended Dec. 31, 1925, revealed the steady progress which is being made by this holding company. Production of electric current for the year 1925 was very satisfactory when compared with the record of the preceding year, the total production from all sources amounting to 260,300,140 kw.-hr., an increase of 33,619,182 kw.-hr. over 1924. The earnings from kilowatt-hour sales during 1925 were $3,784,810, a figure representing an increase of $409,359 over 1924. Considerably less money was devoted to construction work than during the preceding year. It was the feeling of the company's engineers that the existing plant capacities were sufficient to take care of all demands during the years 1925-1926. They comprised eleven hydro-electric plants, having a total installed generating capacity of 93,420 hp., with supplementary steam and gas plants bringing the total capacity up to 106,620 hp., together with the interconnecting lines with the Southern California Edison Company and the San Diego Gas & Electric Company. An expenditure of more than $200,000 was made in making extensions to serve new customers and more than $110,000 was spent in rebuilding and increasing the capacity of overloaded distribution lines in order to improve service conditions. Considerable increases in the number of customers using electricity for heating and cooking were recorded during the year. The total number of meters in service on the entire system as of Dec. 31, 1925, was 20,630, an increase of 1,655 over the preceding year.

Total gross operating earnings during the year 1925 amounted to $4,874,442, compared with $4,498,840 for the year 1924, an increase of $375,602. Operating and general expenses and taxes totaled $2,379,801, against $2,383,105, a decrease of $3,304. Operating profits advanced, therefore, from $2,115,735 in 1924 to $2,494,641 in 1925, an increase of $378,906. The earned surplus of all companies for 1925, after eliminating intercompany transactions and after deducting all fixed charges, etc., including depreciation, was $677,129, compared with $549,840 for the year 1924.

During 1925, owing to the small amount of new construction work undertaken, extensive financing was unnecessary and, as a result, the company sold only first lien bonds to the amount of $500,000. Last month, however, the company entered upon a new financing plan when it floated an issue of 5 per cent. 30-year first trust mortgage gold bonds totaling $23,000,000. By using the funds derived from the sale of these 5 per cent bonds to retire securities bearing interest at the rate of 6 per cent the company effected substantial savings in interest charges. The securities retired were: First lien, series A, 6 per cent bonds of the Nevada-California Electric Corporation, amounting

GENERATING AND TRANSMISSION SYSTEM OF NEVADA-CALIFORNIA CORPORATION

to $9,341,800; first lien, series B, 6 per cent bonds of the Nevada-California Electric Corporation, amounting to $8,804,000; first mortgage 6 per cent bonds of the Nevada-California Power Company, amounting to $1,289,000, and first mortgage 6 per cent bonds of the Southern Sierras Power Company, amounting to $1,774,500.

Company Reports

The following statements of earnings have been issued by electric light and power companies for the month of June:

Name of Company	Gross Earnings for June 1926	1925
Augusta-Aiken Ry. & Elec	$114,194	$98,668
Bangor Hydro-Electric	122,017	115,746
Central Illinois Light	309,662	284,043
Central Maine Power	394,735	388,715
Columbia Gas & Electric	2,625,582	2,521,798
Commonwealth Power	3,775,345	3,430,382
Consumers Power	1,858,750	1,581,686
Electric Power & Light	4,003,784	3,617,348
Illinois Power	175,787	172,204
Kansas City Power & Light	774,581	764,952
Northern Ohio Power	973,993	927,811
Ohio Edison	130,320	111,881
Penn-Ohio System	989,152	870,155
Portland Electric Power	987,929	905,471
Southern California Edison	2,497,050	2,194,901
Southern Indiana Gas & Elec	223,535	201,479
Southern Public Utilities*	489,367	469,625
Tennessee Electric Power	933,813	962,016

*May

Manufacturing and Markets

Red Seal Progress

Committee Reports Increasing Rate of Progress and Refers to Red Seal Plan as a Fundamentally Sound, Timely, Economic and Progressive Measure

FURTHER progress in the aggressive development of the red seal plan "to assure adequate wiring for convenient electric service in the home" has been reported by the committee appointed by the Associated Manufacturers of Electrical Supplies to advise and confer with the Society for Electrical Development in working out the details of the plan. A total of 55 class A red seal licenses have been granted by the society and they cover a territory comprising 816 communities having a population of 500 or over, with a total population of 11,163,076. These figures do not include Toronto where the red seal plan was initiated and still greater progress has occurred since the previous report.

A summary of red seal progress is shown in the accompanying tabulation. Applications for red seal licenses have also been received from a number of organizations covering communities having a total population of 3,370,388, which when added to the population figures of the existing red seal communities will bring the population figures to 14,533,464. Other cities are also considering adoption of the plan.

Increasing Rate of Progress

During the first six months of operation eleven red seal licenses were granted. The following six months witnessed the granting of 50 licenses, and it has taken a year to approach the first 1,000 awards of red seal certificates to new homes. Reports indicate that from now on progress will be at a much more rapid rate.

The adoption of the red seal plan by increasing numbers of communities indicates the realization that the plan has provided a fundamentally sound, timely, economic and progressive measure for the greater utilization of electric service and one which is beneficial to the public and all branches of the industry. A red seal home represents a home where the owner may properly utilize the services of electricity. The public is more than willing to pay the additional cost of wiring to meet the red seal standard. The increasing number of applications for red seal licenses is now taxing the facilities of the society's headquarters staff. To guide a local organization in the steps necessary to file a proper application and determine the specifications requires a considerable amount of detail and time.

The committee in its report states that it is particularly impressed with the high purpose and service of the society in providing a method whereby the public is enabled to obtain a complete and adequate wiring installation by the simple process of indicating a standard which is definitely known and established and protected from misuse for personal or selfish ends. The society has also received a great many requests to apply the red seal plan to the rewiring of old houses and commercial and industrial installations. The committee recommends that no attempt be made to apply the red seal standard to commercial or industrial wiring until it is thoroughly established in the residential field. Although the plan provides for awarding the red seal emblem to homes which are now wired, or which may be rewired, according to the local specifications, it appears advisable to devote attention particularly to new homes at present.

The committee has also given careful consideration to the question of the use of the red seal emblem in the advertising and literature of manufacturers. The committee is firmly of the opinion that the best interests of the industry will be served and the high plane of the red seal standard will be maintained through the strict limitation of the use of the red seal emblem to its real purpose—a symbol of an adequately wired home. While the majority of the homes reported represent individual dwellings, about 5 per cent represent duplex or apartment homes. Apartment houses, varying from 6 to 72 apartments, are recorded as one red seal award.

The committee presented several reports indicating the increased number of switches, lighting and convenience outlets utilized in bringing a wired home to the red seal standard, also the increased number actually installed over the minimum requirements of the red seal specifications. It is significant that when the builders' attention is called to the advantages of adequate wiring the tendency is to install a considerably greater number of outlets and switches than is demanded by the specifications.

Red Seal Exhibits

Red seal exhibits, conducted as a means of acquainting the public with the meaning of the red seal plan and to portray and dramatize the technical details of wiring in a manner understandable to the public, have recently been displayed in Milwaukee, Detroit, Louisville, Kansas City, Rochester, Duluth and Grand Rapids. The movement is spreading, as indicated by requests for information, and the exhibits have proved popular and instructive wherever they have been held. In August, 1925, the first exhibition of an electric home wired in accordance with the red seal plan was opened to the public in Newburgh, N. Y. Since then red seal homes have been exhibited in ten different communities as a means of launching the plan. Ten more are contemplated for early exhibition. They will be completely furnished and will contain the many appliances now on the market for use in the home.

The society has prepared a very complete red seal manual explaining the detailed method of operating the plan locally. The manuals are available for

SUMMARY OF RED SEAL PROGRESS

Class "A" Licenses: League	Date of License	Communities of 500 and Over	Population, 1920 Census	No. of Homes	Date 1925
Syracuse Electrical League	3-24-25	33	304,899	40	4-1
Electrical League of Rochester	4-10-25	36	380,548	93	5-24
Electrical League of the Niagara Frontier	4-15-25	26	667,095	79	5-15
Electrical League of Pittsburgh (including two affiliated leagues)	5- 7-25	169	1,436,723	152	4-29
Electric Club of Louisville	5-16-25	5	243,237	14	3-15
Electrical Extension Bureau of Detroit	6- 4-25	56	1,265,768	124	4- 7
Hudson Valley Electrical League	7-20-25	24	140,219	45	5- 7
Grand Rapids Electric Club	7-23-25	13	154,902	36	5- 1
Electrical League of Minneapolis	8-10-25	10	394,762	40	5- 1
Electrical League of St. Paul	8-11-25	6	249,421	50	4-29
Atlanta Electrical League	8-14-25	10	223,841	71	5-14
Electrical League of Colorado	10-17-25	10	271,955	23	4-30
Electrical League of Tulsa	10-23-25	1	72,075	3	4-15
Memphis Electric League	11- 4-25	3	163,997	9	4-15
Electrical League of Youngstown	11- 4-25	8	162,899	15	5- 3
California Electrical Bureau (including 24 districts)	11-24-25	236	2,498,886	141	4-29
Electrical League of Northern Illinois, west suburban section	1- 5-26	25	217,555	10	4- 7
Electrical League of Muncie	1-29-26	5	40,409	...	....
Electrical League of Peoria	2-24-26	24	124,430	4	4-29
Electrical League of La Crosse	3- 1-26	9	42,920	...	....
Amsterdam Electrical League	3-10-26	1	33,524	1	4-20
Schenectady Electrical League	3-10-26	1	88,723	8	4-20
Electrical League of the Tri-Cities	3-11-26	9	138,705	...	....
Saratoga-Ballston Electrical League	3-20-26	2	17,284	1	4-20
Electrical League of Milwaukee	3-12-26	20	524,764	...	....
Kansas City Electric Club	3-20-26	18	461,175	1	4-20
Electrical League of Toledo	4- 9-26	19	268,785	...	....
Electrical League of Rhode Island	5- 7-26	37	573,775	...	....
Total communities to date		816			
Total population to date			11,163,076		
Total homes to date				960	

distribution by the licensed leagues to contractors and others interested. A prominent manufacturer has also circularized his trade, calling attention to the red seal plan, not in terms of his product, but in a spirit of co-operation to raise the standard of wiring. This has a far-reaching effect, for it brought a great many inquiries into the society for information on the plan as to how it could be secured for individual communities.

The red seal plan is spreading so rapidly as an industry movement that it has taxed to the utmost the facilities of the society in rendering the necessary service to electrical leagues and those contemplating the operation of the plan. The society reports that many important companies directly interested in the market for wire and wiring supplies are not yet enrolled as members of the society or subscribers to the red seal fund.

After a survey of the definite and tangible results of the plan as it is now in operation over a considerable territory and under widely varying conditions, and after continued observations of the careful and ethical handling of the plan by the society, the committee in its report states that it feels fully justified in giving a most unqualified indorsement of the whole movement. The facts given in the report are submitted by the committee as proof that the red seal plan is a complete and successful answer to the problem of adequate wiring in the home. The committee urges that members of the Associated Manufacturers of Electrical Supplies who have not already subscribed to the red seal fund do so by enrolling as members of the Society for Electrical Development, designating that the subscription be applied to this particular fund. This action will be extremely helpful in continuing the plan and the application of this higher standard of adequate wiring throughout the country. The personnel of the committee co-operating with the society was: E. W. Kendall, chairman; H. R. Sargent, C. A. Bates, I. A. Bennett, B. B. Dinsmore, LeRoy Clark and H. B. Kirkland.

Machinery-Selling Methods in Japan

Radical Changes Now in Progress—The present Trade Cannot Be Held on Reputation Alone—Market Well Worth Cultivating in Most Lines

BY LEWIS SMITH
Engineer and Exporter, New York

LONG-ESTABLISHED methods of selling imported machinery in Japan are undergoing radical changes at present. Heretofore the demand for any line of machinery has been so small that it hardly paid any American manufacturer to give much attention to the market. Machinery was bought very largely from quotations submitted by mail, through the medium of some export house, and orders were awarded more on a price basis than for any other consideration. Now, however, the buyers are much better educated in every respect, and with the increasing complexity of machinery it is becoming necessary for manufacturers to provide skilled advice to the buyers by other means than by mail. The English and German makers have always been more active in this respect than the Americans and, having had the advantage of lower prices, they have been able to maintain experts in Japan. In fact, it is characteristic of German companies to send out experts for foreign residence in order to cultivate a market long before the actual volume of business would seem to justify the expense.

WAR FORCED TRADE TO AMERICA

During the war the tide of trade was forced to American machinery, which has now become so well established in Japan that it is given the preference in place of European machinery and price differences, within reason, are overlooked. American manufacturers cannot, however, expect to live only on reputation, and since the market for power plant and industrial machinery is continually growing, they should give more attention to advertising, propaganda, selling methods and service.

It is no longer safe to leave the conduct of the business in the hands of the general exporters, whose employees, though in many cases competent machinery men and engineers, are forced so to diversify their work that they have but a superficial knowledge of each line. Some of the electrical manufacturers, steel companies, etc., have sufficient business to maintain their own organizations in Japan, and so far as possible all machinery manufacturers should have their own factory representative permanently resident in the country. Many manufacturers argue that this expense is too great, forgetting or not knowing that one man in Japan can often turn in more business than many of their district offices in America. If such a man can be fitted into the organization of some import house, as is usually possible, the sales expense becomes very low because the importer will ordinarily supply such a man with all working facilities and traveling expenses, leaving only his salary for the manufacturer to meet. In many cases such a man can act as the representative of a small group of manufacturers in allied lines, thus greatly reducing the expense to each one. As virtually all machinery business in Japan is handled through the import houses, most of which have a good financial standing and maintain New York offices, payments are promptly made in full against shipping documents in New York and there is much less trouble with collections or bad accounts than in the domestic trade. Smaller companies without New York offices will always put up irrevocable letters of credit with their orders, seldom asking or expecting to do business on any other basis, such as sight drafts.

With the increasing complexity of the machinery required, it becomes more and more necessary to make sure that the right machines are specified, and especially to see that these machines are properly installed and operated. The Japanese are, with few exceptions, not good practical engineers and need the expert advice of manufacturers' representatives. While they may prefer to do their business with their own countrymen, yet in buying imported machinery they greatly appreciate the assistance of trained factory men and are quick to patronize the machinery handled by such men. In Japan, too, it is more than ever true that faults are always in the machines and not in the users, and a factory man can accomplish a great deal by stopping unjustified complaints.

American manufacturers are apt to feel that any machine sent to Japan is immediately copied and no more are imported. Sometimes this is true, but the Japanese do not make any success in copying machinery except in the simpler types or those which do not require precise work or the handling of heavy castings, etc., and they certainly have never improved on the imported machines. The attempt is made to copy all machinery once, but usually that is as far as it goes. The result has been that only in a few lines have the Japanese manufacturers seriously interfered with imports, and while in many lines there is more or less competition from local makers, the local product is so inferior that the buyers themselves always prefer the imported machines even at a considerable price difference. It must be remembered that copying of imported products is not necessarily a Japanese characteristic, because all nations, American included, do exactly the same thing.

Owing to the cheap labor in Japan, the import duty and the transportation costs, it is becoming more and more common for American manufacturers to enter into a manufacturing agreement with some well-established company in Japan. There are a number of well-equipped plants in Japan, and when conditions warrant the step it is quite possible for the American companies to place in these plants a few of their own men and develop a substantial and satisfactory business through these plants.

MARKET WORTH CULTIVATING

That the Japanese market is well worth cultivating in most lines should be obvious. With a population of sixty millions, which can only exist through manufacturing, with the great markets of China and other countries all the way to India to supply, and with a powerful and stable government, which commands greater respect from the people than any other government in the world, the country is bound to absorb a vast amount of industrial machinery for many years. The depression following the war and the great earthquake is now becoming a thing of the past, and the time is ripe for American manufacturers to make intensive and intelligent efforts to get a full share of the business.

Business Conditions

THE general tone of the electrical market this week is good. Construction work is active and the utilities are buying in considerable volume. Industrial sales are fair and jobbers generally report satisfactory business for this season. Appliances are spotty, though moving strongly in some localities.

New England reports strong demands for small motors, though heavy industrial equipment is quiet. Oil burners and refrigerators are active and street lighting is gaining, but the jobbers have slackened somewhat. Public utility buying has been very active in the New York district, with good sales of transformers and switching equipment. The industrial market is slow. In the Southeast crop conditions are most promising and power company business is strong with much in prospect. Fans have been phenomenally active and fixtures are selling well. Appliances are somewhat off. Optimism prevails in the Middle West. Wire is selling well, also wiring devices. Radio material is moving briskly. The month has been most satisfactory. On the coast business is rather quiet, but Northwest lumber mills are coming into the market and there is some good street lighting in sight.

Non-Ferrous Metals Stronger and Prices Up

Copper prices are about ten points above those of last week, with continued good sales. Two advances in the price of lead, accompanied by a good volume of business, were also features of the non-ferrous metal market for the week. Tin, too, is slightly higher. Up until Tuesday practically all copper sales were at the same level obtained last week, which was 14¼ cents for Eastern delivery, with some orders in the Middle West at 14⅜ cents. Business continued in excellent volume, with somewhat firmer quotations in London. On Tuesday some sellers advanced prices from 14.30 cents to 14⅜ cents in the East, but business at the higher levels slacked off. More September and October business has been booked probably to cover the needs of manufacturers for finished materials already on order and there appears to be less buying except to cover needs. November copper is available at current prices. Some producers have no copper for early shipment and others seem to have sufficient for all reasonable demand.

Active buying in the Middle West has brought the St. Louis market for lead within 7½ cents of the American Smelting & Refining Company's New York price, which is 8.75. The leading interest in the Middle West has appeared to be following rather than leading the market upward and has made some sales to favored customers at levels below the prevailing figures, which Tuesday and Wednesday was 8.675. A little higher price has been realized, however, on some lots sold by second hands. The amount of soft Missouri available is limited, but there seems to be no difficulty in obtaining desilverized for early delivery. There was a mark up of $3 a ton by the Smelting company on July 23 following an increase in London prices. On Monday London jumped again, thereupon the New York price increased to 8.75. London increased again on Tuesday, but dropped back, and no further advance was made in New York. There is a brisk demand on the part of corroders.

Consumers of tin have not been very active in the domestic market, but prices have been strong. Zinc sold substantially in the same volume as last week, prices ranging from 7.45 to 7.50.

NEW YORK METAL MARKET PRICES

	July 21, 1926 Cents per Pound	July 28, 1926 Cents per Pound
Copper, electrolytic	14¼	13.95–14.40
Lead, Am. S. & R. price	8¼	8.75
Antimony	14½	15⅜
Nickel, ingot	35	35
Zinc spots	7.475	7.825
Tin, Straits	63¾	63.625
Aluminum, 99 per cent.	27½	27½

Base copper price July 28, 1926, 16 cents.

Power Company Buying Active in New York District

Sales to public utility companies in the New York district have been very active during the past few days in practically all lines. Orders include a single-phase, 7,200-kva. transformer for railway service, one order for switching equipment totaling more than $50,000 in value, together with numerous smaller orders for pole-line hardware, cross-arms, poles, circuit breakers, etc. One manufacturer reports that it has been necessary to increase the time of shipments on account of the large volume of orders on hand. In the industrial field buying is somewhat spotty. The demand for motors up to 10 hp. continues fair, but larger sizes are very dull. Auxiliary and control equipment sales in all sizes are very poor, although some inquiries are being received, and it is expected that this line will show an improvement next month. Jobbers report a fair demand in all lines.

General Conditions Good in Southeast—Electrical Sales Active

The Southeast reports generally satisfactory business for this period of the year. Agricultural conditions throughout middle and south Georgia and Alabama are being reflected in the general optimism prevailing. The watermelon crop has been particularly satisfactory, with heavy shipments and good prices; the peach crop is being marketed under better conditions than for many years past, and indications are that the tobacco crop will be the best on record.

Central-station purchases of line construction materials continue very active, but no large single orders are reported this week. The South Georgia Power Company has announced a $2,000,000 construction program which will improve electrical facilities in more than 34 towns in southwest Georgia. An order for a 1,000-kw. turbine was received this week from Alabama and an order for a 75-post white-way installation in Florida is reported. Orders for meters and distribution transformers are also satisfactory. Two orders were taken this week from one large power company for three 3,000-kva. transformers and $8,000 worth of switching equipment and small transformers.

Residential and commercial lighting fixtures continue in good demand and an order was placed last week for 800 units for installation in the Atlanta public schools and another order for 700 additional units is in immediate prospect. Retail appliance sales are somewhat off, excepting fans, which are doing phenomenally well but the expansion of the larger power companies into the small communities will stimulate appliance business to a high level between now and the late fall.

Activities in textile lines, while quiet, are broken here and there and an electrical contract approximating $100,000 was closed this week for an addition to a large textile mill in Georgia. Purchases by steam railways are looking up. The Southern Railway has started the installation of 72 miles of automatic electric signals in Mississippi and Louisiana and is pushing to completion 100 miles of similar installations in Georgia.

Middle West Electrical Market Strong and Active

Plenty of optimism prevails in the electrical industry in the Middle West. Wire business is exceptionally good due to the large amount of construction work in process. The following varying promises are being made on wire deliveries: Code, immediate delivery; lead and rubber, four to ten weeks; varnished cambric, three to ten weeks; paper and lead, four months. The price on No. 14 solid single braid code decreased 20 cents last week, making the price now $5.80 per thousand feet. On July 17 weatherproof wire advanced ¼ cent, making the base price 17¾ cents per pound. Another increase in the price of weatherproof wire is reported as likely to come soon, as the copper market is now strong and getting stronger.

The hot days of last week, when the thermometer registered around 96 deg., made fan sales good for a while, but dealers are rather pessimistic as to the prospects of selling many fans this year as only one month of real fan weather remains. Electrical retail business with the exception of fans is good, though not booming. Large orders for radio material are being placed at this time in anticipation of a good season.

One of the large manufacturers of wiring devices reports an exceptionally good business so far this month, trade being somewhat better than for the corresponding period of last year. Demand for central-station equipment remains strong and sales are exceeding last year. On the whole, July business has been very satisfactory.

With slight changes business in the St. Louis district continues the same as in the earlier summer. Orders from the southwest Missouri territory

have been coming with great regularity and running largely to transmission line material, poles, hardware, etc. Other parts of the district report sales holding up remarkably well, but nothing within the last week large enough to be worthy of special mention.

Pacific Coast Quiet—Good Business Afoot in Northwest

The electrical business is rather quiet on the Pacific Coast this week. Power company orders are light, consisting largely of pole-line and duct material and line tools. A 20,000-lb. friction tape contract was closed and there was some movement in mill-type lighting units in San Francisco. The most notable orders by utilities were reported in Seattle, embracing 15,000 lb. of weather-proof copper wire. The city also purchased approximately $22,000 of insulated lead-covered cable and $12,000 of junction boxes. Some very interesting business is in sight in the Northwest as a result of a number of recent lumber mill fires in western Washington, approximating losses in excess of $1,500,000, all of which will be rebuilt and require much electrical equipment. Also two large paper mill developments are about to come into the market.

There is considerable street lighting business in sight in California, following a recent act of the Legislature which obviates necessity for securing funds in advance of bids on projected work, properly petitioned by taxpayers. Berkeley is considering a $30,000 metal pole purchase and $70,000 in wiring supplies. Sonora has a project afoot. Some buying has been done by copper and oil companies, and sales of material for several private power lines have been booked.

Small Motor Sales Active in New England

Small motor sales in this district are encouraging and are of marked interest because of the seasonal tendency to defer purchasing of electrical supplies and equipment. During the past week small motor sales gained; one manufacturer records sales exceeding by more than $2,000 in amount the receipts of the previous week; another reports sales for the month of July to be about 30 per cent above the volume recorded for June with heavy demands from machine tool industries, oil burning and refrigeration, the latter commodities drawing well from fractional horse-power capacities. On the other hand, the demand for heavy industrial equipment is light; negotiations are under way for a number of installations of turbo-generators, and the outlook for resumption of buying is good. As compared with last year, one manufacturer reports the movement during the past few weeks to be favorable, and the encouraging aspect of industry in general in this district forecasts much promise for the remainder of the year. Industrial heating is quiet.

Refrigeration and oil-burning equipment are attracting attention. One manufacturer has installed more than 1,000 oil-burning units within the central Massachusetts district during recent months, and demands for this type of equipment are growing actively throughout this district. Small switches and control apparatus are selling well, with the demand quite strong among industrial plants where replacements and additions are being carried out. These orders are reported for small lots, but the volume is good and steady. Street lighting is gaining in interest with several large projects under consideration. The city of Quincy recently appropriated $10,000 for a "white way."

Household appliance sales are spotty and jobbers report some slackening in sales and collections; central stations, on the other hand, are maintaining a level in volume comparable to that of last year.

Activities of the Trade

Ice and Refrigerator Executives Condemn Unethical Advertising

During recent months a rather acute situation has developed between the ice and electric refrigeration industries as a result of unethical advertising which has been appearing with increasing frequency in various parts of the country. This situation has attracted the attention of executives in both industries and has been taken up by associations representing the various interests concerned. With the hope that a common ground of mutual interest could be found, a conference was called last month by the National Association of Ice Industries in Chicago. The meeting was attended by representatives of large ice companies and manufacturers of electric refrigerators, the American Association of Ice and Refrigeration, the National Association of Ice Industries, the Society for Electrical Development, and the Electric Refrfigeration Council, the latter being an organization of electric refrigerator manufacturers now in process of formation.

At the meeting, examples of negative advertising which have appeared recently in the form of newspaper advertisements, booklets and letters were reviewed and discussed. Advertisements emanating from both industries making disparaging references, and in many cases positive misstatements of fact, were pointed out. It was generally agreed among those present that all advertising of this class is not only ill-advised but also fruitless and unprofitable, and a positive waste of money and effort.

Resolutions which are just announced were adopted at the meeting pledging the associations and companies represented to use their influence to bring about the abatement of such advertising, and calling on newspapers and magazines to refuse such advertising; also urging advertising agencies and publicity writers to use only constructive methods in presenting the subject of refrigeration to the public.

Elliott Company Acquires Ridgway Dynamo & Engine

The Elliott Company of Pittsburgh, now operating plants at Jeannette, Pa.; Springfield, Ohio, and Wellsville, N. Y., and with branch offices in principal business centers, has purchased the extensive plant of the Ridgway Dynamo & Engine Company at Ridgway, Pa., together with its good will and other assets.

The Ridgway Dynamo & Engine Company has been a successful manufacturer of steam and electric machinery for more than 30 years, and enjoys an excellent reputation. Under Elliott Company management the Ridgway plant will be improved, production increased and sales work aggressively pushed.

This acquisition is a further step in the expansion program of the Elliott Company, which in recent years has been forging ahead at a rapid rate in extending and developing its power machinery business. Less than two years ago the Kerr turbine, formerly manufactured by the Kerr Turbine Company of Wellsville, N. Y., was added to the list of Elliott products.

With the addition of the Ridgway line, the Elliott Company organization is manufacturing a very complete group of power equipment, including steam turbines and generators, several different types of engines, all types of condensers, feed water heaters, air ejectors, deaerators, motors, and electrical machinery, as well as smaller items such as strainers, filters, valves, and boiler tube cleaners.

Westinghouse Sales for Second Quarter Show Gain

Sales of the Westinghouse Electric & Manufacturing Company for the quarter ended June 30, 1926, amounted to $44,862,357 and compares with $44,432,211 for the corresponding quarter of last year. Orders booked during the first quarter of the year were $52,596,434. Billings for the quarter ended June 30 totaled $45,139,956 and compare with $38,268,378 in the corresponding quarter last year.

Allis-Chalmers Reports Larger Booking for Second Quarter

Allis-Chalmers Manufacturing Company, Milwaukee, has issued the following quarterly statement of earnings, sales billed, unfilled orders and net profits by months, for the second quarter of 1926:

	1926		1925	
	Billing	Net Profit	Billing	Net Profit
April.....	$2,444,206	$270,605	$2,308,804	$275,908
May.....	2,428,169	265,157	2,365,896	271,497
June.....	2,481,692	290,395	2,368,050	282,617
Total..	$7,354,067	$826.157	$7,042,750	$830,022

The net profits reported are after full provision for all taxes, depreciation and other reserves.

Deducting from the foregoing earnings an item of $288,702.75, representing quarterly dividend on the preferred stock, leaves a balance of $537,455.01

available for the common, which is equivalent to $2.09 per share compared with $2.10 per share for the second quarter of 1925. Net profits for the six-month period aggregate $1,654,559.21, equal after preferred to $4.18 on the common. This compares with $1,677,075.50 in 1925 or $4.27 on the junior shares.

The unfilled orders on hand as of June 30, 1926, aggregated $12,884,348, contrasted with $10,147,072 at the commencement of the year. Bookings of new business for the current half year amounted to $17,419,361.51, compared with $13,718,405.78 for the same period a year ago, an increase of $3,700,955.73, or about 27 per cent.

The Servel Corporation, 17 East Forty-second Street, New York, manufacturer of electric refrigerating equipment, has preliminary plans under consideration for the erection of a new plant unit at Evansville, Ind., to provide a large increase in output. A number of new buildings will be built and improvements made in existing structures. The complete project will cost approximately $1,000,000, with equipment.

Warren J. Greene, head of W. J. Greene, Inc., of Watertown, N. Y., one of the best-known wholesale and retail electrical stores in northern New York, has sold his interests in the business to Lawrence O. Moore, and Roy E. Smith of that city. Mr. Moore has been associated with the Greene Company for the past ten years. Mr. Greene will leave for California within a few weeks, after 22 years in the electrical field in Watertown. Mr. Smith will succeed Mr. Greene as president, and Mr. Moore will continue as vice-president of the new organization.

Ivan Stewart Forde, who for a number of years was manger of the small turbine division of the Westinghouse Electric & Manufacturing Company, and for the past three years manager of the sales promotion department of the Diamond Power Specialty Corporation, has resigned to become affiliated with the Furnace Engineering Company, manufacturer of the Simplex unit pulverizer, as sales manager, with headquarters at 5 Beekman Street, New York City.

The Noma Electric Company, 487 Broadway, New York, has leased space in the building at 340-344 Hudson Street, for extensions in its works.

The Erie Malleable Iron Company, Erie, Pa., announces the following additions to its sales staff handling the threadless "Kondu" fittings: Ralph H. McCormick, formerly with Harvey Hubbell, Inc., and Waldo T. Pratt, formerly with the E. S. Francis Company, are located at 161 Devonshire Street, Boston; C. S. Crossman, formerly with the Alpha Electric Company; H. Spencer Altman of the Syracuse Washing Machine Corporation and George O. Bowman of the Hudson Electrical Supply & Equipment Company are located at 50 Church Street, New York; Henry J. Damm travels out of the Cincinnati office, 909 Dixie Terminal Building, and Ernest M. Coverdill is connected with the Detroit office in the Kresge Building.

Charles J. Murray has resigned from the staff of the Linde Air Products Company, to become associated with the Oklahoma Contracting Company. He is now organizing a new division of that concern to engage exclusively in oxwelded pipe-line construction. During his association with the Linde company Mr. Murray specialized in this class of work and has studied the problems connected with a large number of notable trunk-line projects.

The Electric Refrigeration Corporation, Detroit, Mich., manufacturer of electric refrigerating equipment, has plans in preparation for the erection of a new plant at Fullerton Avenue and the junction of the Père Marquette and Pennsylvania Railroad, where a 38-acre tract of land has recently been secured. The new works are expected to cost close to $700,000, with machinery, and are being designed to increase the present production facilities more than 100 per cent.

The Royal Electrical Laboratory, 109 Tichenor Street, Newark, N. J., manufacturer of electrical specialties, suffered a fire on July 13, which destroyed a portion of the plant and equipment and caused a loss reported at about $25,000. The damaged portion will be rebuilt immediately.

E. A. M. Sweeney, for ten years representative of the Hotpoint Electric Heating Company in New York City and for seven years manager of the appliance department of the Alpha Electric Company, New York, has started in business as a manufacturers' representative with an office and showroom in the Fifth Avenue Building, representing Smith Ceramic Studios, Inc., manufacturer of glass and china table lamps and shades; Donovan & Barber pottery lamp bases and shades; Halliwell-Shelton Electric Corporation, manufacturer of vibrators and violet ray machines; Clapp Eastham Radio Corporation and National Electric Appliance Company, manufacturers of curling irons and hair wavers.

W. J. Debbler, formerly sales representative of the Kelvinator distributing organization at Brockton, Mass., has joined the sales staff of the Wetmore-Savage Company, Boston, Mass., and will specialize in refrigeration work in this jobbing house.

The Holophane Glass Company, Inc., 342 Madison Avenue, New York, announces the development of the "Gloria" Holophane lamp for residential lighting. This lamp uses an internal Holophane globe which provides scientific and correct light distribution. The company states that it will be reserved for the present for central-station companies as a campaign item for increasing residential business.

Link-Belt Company, Chicago, held its "drive chain conference" this year at Indianapolis, July 7, 8 and 9. This was the sixteenth conference on drive chains in the last twenty years. Fifty sales representatives from all sections of the country were present. James S. Watson, general manager of the Dodge plant and of the company's drive chain divison, presided.

The Kuhlman Electric Company of Bay City, Mich., manufacturer of power, distribution and street lighting transformers, announces the establishment of a factory office at 3-260 General Motors Building, Detroit, Mich. Richard P. Johnson will have charge of this office.

New Equipment Available

Explosion Proof Motor and Control

An explosion proof direct-current motor and control, designed primarily for service in coal mines in which the presence of large quantities of gas or coal dust makes the use of electrical equipment of special construction essential to safe operation, has been developed by the Westinghouse Electric & Manufacturing Company. While designed particularly for small pumps, the motor, which develops 5 hp. at 1,150 r.p.m., can be used in a number of other applications. It is of the totally inclosed type, the brackets being provided with covers which can be easily removed to facilitate inspection and brush adjustments, or replacements. These covers are also arranged so that they may be sealed to the brackets in order to prevent removal by unauthorized persons. All connections between the motor leads and the power supply are made inside of the motor frame. The conductor cable is brought out through a special brass stuffing box which is packed with asbestos twine, forming an explosion proof seal.

The controller is of the magnetic push button type, inclosed in a strong explosion proof case made in two sections. The panel on which the contactor is mounted is firmly fastened to the lower section and the upper section fits over this panel and is fastened to the base by means of a bronze clamping ring. This method of construction eliminates entirely the use of bolts or screws. This 5-hp. motor and control has been developed to meet the United States Bureau of Mines requirements for electrical equipment designed for use in gaseous mines and has successfully passed its tests.

Magnet Controller

The Ohio push button magnet controller operating through a compact master control has been placed on the market by the Ohio Electric & Controller Company, Cleveland. The master button, which can be attached at any convenient point, can be operated with thumb or finger and is so designed that it may be operated by means of the foot when desired. A fuse on the control panel protects the control circuit against a ground or short circuit, and the master button cannot be operated accidentally owing to the use of a barrier placed between the operating levers. The controller is capable of operating a magnet of any size.

New Trade Literature

INSULATION AND PROTECTION OF POWER-HOUSE EQUIPMENT.—A pamphlet on the insulation and protection of power-house equipment has been issued by Johns-Manville, Inc., 292 Madison Avenue, New York. The pamphlet describes the chief Johns-Manville products used in the power house, that is, heat insulation, switchboard panels, electrical insulation, fiber conduit, roofings, sidings and industrial flooring. Illustrations showing the application of the company's products are included.

CENTRIFUGAL PUMPS.—A publication describing the De Laval pumps used in the Fairmount pumping station at Cleveland has been issued by the De Laval Steam Turbine Company, Trenton, N. J. The bulletin cites the reason for the selection of turbine-driven centrifugal pumps and contains a complete, fully illustrated description with heat entropy diagrams of the Fairmount pumping station and heating plant.

MOTORS.—Bulletin 106 issued by the Northwestern Manufacturing Company, Milwaukee, describes and illustrates the company's direct-current and alternating-current crane and hoist motors, from 1 hp. to 75 hp. direct-current and from 1 hp. to 100 hp. alternating-current. The company has also issued bulletin 102, covering its direct-current motors from ¼ hp. to 150 hp., 40 deg. C., continuous duty, for general purpose application.

DIESEL ENGINES.—"Economy of Diesel Engine Power" is the title of a 32-page bulletin issued by Fairbanks, Morse & Company of Chicago. The bulletin analyzes the various factors which affect the cost of power and discusses the costs of a typical small Diesel power plant as compared with similar costs for a steam plant. A discussion of the application of Diesels in a wide variety of industries, including the public utility field, and illustrations of Diesel equipped plants are also included.

WORM REDUCTION GEAR.—The De Laval worm reduction gear with pressure oiling system is described in a leaflet issued by the De Laval Steam Turbine Company, Trenton, N. J.

PYROMETER. — The H-K (Holborn-Kurlbaum) optical pyrometer is described in bulletin 293 issued by the Bacharach Industrial Instrument Company, 7000 Bennett Street, Pittsburgh. The bulletin discusses the measurement of high temperatures, and includes a table of applications with the method of making determinations and the corrections to be applied.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

Purchase and agency are desired in Stuttgart, Germany (No. 21,449), for automobile accessories.

Purchase is desired in Frankfort, Germany (No. 21,371), of 1,000 commutators for small motors.

Purchase or agency is desired in Santos, Brazil (No. 21,453), for electrical appliances, especially soldering outfits.

Purchase and agency are desired in Vancouver, Canada (No. 21,348), for electrical devices and supplies.

Purchase and agency are desired in Vancouver, Canada (No. 21,349), for electrical supplies.

Purchase is desired in Chemnitz, Germany (No. 21,345), of household appliances.

An agency is desired in Vienna, Austria (No. 21,446), for household appliances.

A sole agency is desired in Melbourne, Australia (No. 21,435), for household appliances and toys.

Purchase and agency are desired in Saskatchewan, Canada (No. 21,466), for household equipment.

An agency is desired in Riga, Latvia (No. 21,341), for lighting fixtures and appliances, lamps and wire.

A sole agency is desired in Amsterdam, Netherlands (No. 21,465), for electric vegetable slicers.

An agency is desired in Vienna, Austria (No. 21,350), for combined and portable vacuum cleaner and dust blower.

Purchase is desired in Montevideo, Uruguay (No. 21,452), for wire, fusible lead, short circuits, interrupters, etc.

Purchase and agency are desired in Madrid, Spain (No. 21,411), for wiring for automobiles.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

HARTFORD, CONN. — The Hartford Electric Light Company has made application for permission to install five underground conduits, each 3 ft. square, through the Hartford dike.

FALL RIVER, MASS.—The Eastern Massachusetts Street Railway Company plans the early rebuilding of the portion of its power station on Hartwell Street destroyed by fire, July 13, with loss of about $18,000.

HOLYOKE, MASS.—The American Writing Paper Company contemplates the installation of electric power equipment in its 16 mills at Holyoke, Unionville and Windsor Locks, Conn. The entire project will cost in excess of $1,000,000.

QUINCY, MASS.—A new "white way" is about to be laid out. This system calls for the installation of 95 lights of 1,000 candle power each. The Quincy Electric Light & Power Company will make the installation.

SPRINGFIELD, MASS. — The United Electric Light Company will install an underground conduit system on Columbus Avenue, totaling 20 miles, to cost about $25,000.

NORTHFIELD, VT.—N. Pelaggi & Company plan the installation of electric power equipment in connection with the proposed rebuilding of their granite plant recently destroyed by fire with loss of about $150,000.

Middle Atlantic States

WASHINGTON, D. C.—Bids will be received by the Navy Department until Aug. 11, for main motors, generators and control equipment for submarines V-5 and V-6 (Postponed from July 28).

WASHINGTON, D. C.—Bids will be received by the General Purchasing Officer, Panama Canal, Washington, D. C., until Aug. 10, for a quantity of electric sockets, fuses, cable, wire and other electrical and mechanical equipment (Panama Circular 1747).

BALTIMORE, MD.—The Bethlehem Shipbuilding Company contemplates the installation of electric power equipment in connection with proposed extensions in its local plant estimated to cost in excess of $500,000.

BALTIMORE, MD.—The Jones Hollow Ware Company, 1010 Ashland Avenue, manufacturer of plumbing equipment, etc., plans the installation of electric power equipment in connection with the proposed rebuilding of its plant recently destroyed by fire.

WOODBRIDGE, N. J.—A proposition is under way by the Woodbridge Business Men's Association for the installation of an ornamental lighting system on Main Street, from Amboy Avenue, to the Town Hall.

ASBURY PARK, N. J. — The Eastern New Jersey Power & Light Company has awarded a general contract to Dwight P. Robinson & Company, 125 East Forty-sixth Street, New York, for the erection of an eleven-story office and operating department building on Bangs Avenue, estimated to cost $900,000.

BROOKLYN, N. Y. — Electric power equipment will be installed in the four-story addition to be erected to the woodworking plant of Pisciotta Brothers, 426 Troutman Street, estimated to cost $115,000.

PITTSFORD, N. Y.—The Rochester Gas & Electric Corporation has begun work on a new street lighting system consisting of eighty street lamps. 500-cp. lamps on ornamental iron standards will be placed in the business district and 200-cp. lights will be used in the residential section.

ROCHESTER, N. Y.—Main Street East is to have a new lighting system consisting of 1,400-cp. lamps mounted in pairs on staggered ornamental steel standards 16½ ft. high and fed from underground conduits. The system will be installed by the Rochester Gas & Electric Corporation.

TUCKAHOE, N. Y. — The Westchester Lighting Company, Mt. Vernon, will proceed with superstructure for its proposed local substation.

HINSDALE, N. Y.—The Village Board of Trustees is planning extension of the village street lighting system into the outlying sections of the village.

LOCKPORT, N. Y.—The Lockport Light, Heat & Power Company has purchased a four-story building heretofore used as a flour and feed mill and will remodel and improve for an addition to its power plant.

NEWARK, N. Y.—The American Telephone & Telegraph Company, 195 Broadway, New York, has plans for a two-story repeater station, 27 ft. x 50 ft., on local site, and will begin work at an early date.

NEW YORK, N. Y.—Kingan & Company, Ltd., Indianapolis, Ind., plans the installation of cold storage and refrigerating equipment in its two-story and basement storage and distributing plant at Brook Avenue and East 156th Street, to cost $150,000.

NEW YORK, N. Y.—The New York Edison Company has leased a four-story building, 25 ft. x 100 ft., to be erected by the Yonkers Holding Company, 116 East Nineteenth Street, at 151 East Eighty-sixth Street, for general operating and office service. It will cost $115,000.

HOP BOTTOM, PA.—The Foster Electric Light Company is being organized by local interests to construct and operate a power plant for local light and power service.

LEIDIGHS, PA. — The Kraybill Power Company plans the rebuilding of the portion of its electric power station destroyed by fire, with loss reported at about $20,000.

LEWISTON, PA. — In connection with a new one story sash and door factory, 60 ft. x 140 ft. in size, the Overland Door Company plans the erection of a small one story power plant and the installation of individually driven machinery throughout the new plant.

PHILADELPHIA, PA.—Bids will be received by the Bureau of Water, Department of Public Works, City Hall, until Aug. 3, for switchboard, wiring and electrical equipment for the Torresdale high service station (Contract No. 829).

PHILADELPHIA, PA.—Bids will be received by the Pennsylvania Railroad Company, Filbert and Seventeenth Street, Montgomery Smith, purchasing agent, until Aug. 4, for 10,000 to 12,000 track circuit connections with fittings.

PHILADELPHIA, PA.—The Philadelphia Rapid Transit Company has made application for permission to issue preferred stock for $5,000,000, a portion of the fund to be used for additional substations, transmission and distributing lines.

NEFFS, PA.—The Pennsylvania Power & Light Company, Allentown, has authorized the construction of a transmission line for light and power service in this district.

PHILADELPHIA, PA.—Plans have been completed by the Baltimore & Ohio Railroad Company, Twenty-fourth and Chestnut Streets, for a new cold storage and refrigerating plant on Delaware Ave., reported to cost in excess of $175,000 with equipment. H. A. Lane is engineer.

RICHMOND, VA.—The Virginia Public Service Corporation is completing a high-tension transmission line from Clifton Forge to Staunton.

BRISTOL, VA.—The City Council has tentative plans under advisement for the installation of an improved lighting system in the vicinity of State and Sycamore Streets in the business district.

STAUNTON, VA.—The Virginia Public Service Company, Charlottesville, Va., has preliminary plans for extensions in transmission lines in Augusta County for a distance of about 15 miles.

CHARLESTON, W. VA.—C. A. Cabell, president of the Carbon Fuel Company, plans the erection of a one story brick and concrete power plant in connection with the proposed expansion of that company's coal mining activities in Kanawha County.

North Central States

CHICAGO, ILL.—The Baltimore & Ohio Railroad Company, Baltimore, Md., will install electric power equipment in its proposed shops and terminal on the Little Calumet River, southwestern Chicago. The entire project is reported to cost in excess of $5,000,000.

CHICAGO, ILL.—The Emil J. Paidar Company, 1129 North Wells Street, manufacturer of barber shop equipment and supplies, will install electric power equipment in its proposed seven-story plant at Wells and Elm Streets, estimated to cost $500,000.

MIDDLETOWN, ILL.—The Central Illinois Public Service Company, Springfield, plans extensions in transmission lines in this vicinity as well as at Kinmundy, Creal Springs, New Liberty, Mendon and neighboring sections, where isolated lighting plants recently have been acquired.

ANDERSON, IND.—Work will soon begin on the new unit at the plant of the Remy Electric Company, to be one story, 300 ft. x 600 ft., to cost about $350,000 with equipment.

EVANSVILLE, IND.—The Graham Glass Company has filed plans for the construction of a new power plant to cost approximately $100,000, with equipment.

OTTUMWA, IOWA.—The Iowa Southern Utilities Company is disposing of a bond issue of $1,100,000, a portion of the proceeds to be used for extensions and improvements in power plants and system.

NEWTON, KAN.—Plans for the construction of an additional high-tension transmission line has been announced by the Kansas Gas & Electric Company, Wichita. The line will connect Newton with the largest generating station in the state.

WICHITA, KAN.—The Kansas Gas & Electric Company is now putting the city's electric distribution system underground. The approximate cost is $1,000,000.

ARLINGTON, KY.—The Lambe Utilities Company, Bardwell, Ky., plans the construction of a transmission line to Milburn, Ky., where commercial service will be furnished. A substation is also projected.

DETROIT, MICH.—The Dodge Brothers Motor Company, Joseph Campau Avenue, will install electric power equipment in its proposed one-story addition, 80 ft. x 325 ft., estimate to cost $200,000.

HOUGHTON, MICH.—The Central Public Service Company, Chicago, Ill., has acquired the property of the Houghton County Electric Light Company and plans extensions and improvements.

LUDINGTON, MICH.—The United Power & Light Company is planning the construction of a transmission line through Bear Lake Township.

GRAND MARAIS, MINN. — Whitney Brothers are completing plans for the construction of a one-story electric light and power plant for local commercial service, reported to cost about $25,000.

FREDERICKTOWN, MO.—The Missouri Electric Power Company, Marshfield, Mo., plans extensions in transmission lines in this section. The company recently acquired the municipal electric power station.

JOPLIN, MO.—The Empire District Electric Power Company has authorized plans for the construction of a one-story equipment storage and distributing building at Fourth and Division Streets, estimated to cost $25,000.

KANSAS CITY, MO.—The Kansas City Power Securities Company is to erect an electric power plant of 10,000-kw. capacity, in the Texas Panhandle oil field, to cost about $1,250,000.

POPLAR BLUFF, MO.—A proposition is under consideration for the installation of a "white way" system in the downtown district.

ATHENS, OHIO.—The Athens Chemical Company, 48 Miami Street, Columbus, Ohio, will install electric power equipment in its proposed local salt mining and refining plant, estimated to cost $150,000. C. R. Monsurat is president.

BEDFORD, OHIO.—The Cleveland Electric Illuminating Company, Cleveland, contemplates the construction of a one-story substation on the Northfield Road, estimated to cost $40,000.

CINCINNATI, OHIO. — The William Powell Company, 2521 Spring Grove Avenue, manufacturer of valves, etc., will install electric power equipment in its proposed two-story addition estimated to cost $200,000.

MADISON, NEB.—The City Council is reported to be planning the rebuilding of the portion of the city electric lighting plant recently destroyed by fire, including the installation of additional equipment.

GRAND FORKS, N. D.—The Northern State Power Company, Bismarck, has plans under way for the construction of a new power plant, reported to cost about $175,000. A transmission line will be built from Grand Forks to Larimore, about 30 miles.

PETERSBURG, N. D.—The Otter Tail Power Company, Fergus Falls, Minn., plans the construction of a transmission line from Petersburg to a number of communities in the northeastern section of the state.

VENTURIA, N. D.—The Northern Power & Light Company, Bismarck, N. D., is planning the construction of a transmission line to Hehr, Zeeland, Hague, Venturia and vicinity, about 55 miles, in all.

CIRCLEVILLE, OHIO. — The Goeller Broom Manufacturing Company plans the installation of electric power equipment in connection with the proposed rebuilding of the portion of its plant recently destroyed by fire. The reconstruction will cost about $150,000.

PORTSMOUTH, OHIO.—The City Council, it is reported, is planning extensions and improvements to the local street lighting system. The plans include a system of ornamental lighting throughout the business section and the extension of regular lighting system in the outlying districts. It is also planned to replace some of the present lamps for those of higher candle power.

CALEDONIA, WIS.—The installation of a street lighting system in the village of Franksville, center suspension type, has been authorized by the town board of Caledonia. Electric service is supplied by the Wisconsin Gas & Electric Company.

CLINTONVILLE, WIS. — The Central Wisconsin Power Company proposes to dismantle the old power house at its Big Falls hydro-electric station to provide for the construction of a new plant.

KIEL, WIS.—Arrangements have been made between the Badger Public Service Company and the Village Council whereby the former will supply electricity for the municipal electric light and water plant after Oct. 1. A transmission line of 13,200 volts will be erected to connect the two systems. The cost is estimated at $15,000.

LANDER, WIS.—The Lander Electric Light & Power Company has filed plans for the construction of a one-story substation, reported to cost about $20,000.

MONROE, WIS.—The Common Council finally adopted the proposal providing for the installation of an ornamental street lighting system in the downtown district to consist of 60 standards equipped with 400 and 250 candlepower lamps.

WINTER, WIS.—Plans have been completed by the North Electric Light & Power Company for the erection of electric plants at Winter and another at Exeland.

Southern States

SELMA, ALA.—The City Council is considering tentative plans for extensions in the ornamental lighting system in the downtown section, reported to cost in excess of $15,000.

BATESVILLE, ARK.—The City Council plans extensions and improvements in the municipal electric lighting plant, including the installation of a 400 hp. Diesel oil engine, electrical equipment and accessories.

BOCA RATON, FLA.—The Florida Power & Light Company, Miami, has contracted with the City Council for the installation of an ornamental lighting system on the East and West Dixie Highway, and on Palmetto Park Road.

DAYTONA BEACH, FLA.—A proposition is under consideration for the installation of an ornamental lighting system on Beach Street. The Chamber of Commerce is interested in the work.

DAYTONA BEACH, FLA.—The Florida Power & Light Company, Miami, Fla., is reported about to expend $150,000 for improvements, including 13,000 volt transmission lines along Halifax Canal between Port Orange and Ormond, together with sub-station.

TAMPA, FLA.—A proposition is under consideration for the installation of an ornamental lighting system on Florida Avenue. B. L. Hammer, 205 Zack Street, is at the head of the project.

WILLISTON, FLA.—The City Council is reported to have preliminary plans under way for the rebuilding of the municipal electric light and power plant recently destroyed by fire, with loss reported in excess of $100,000.

SEBRING, FLA.—A special election has been called on Sept. 17, to vote bonds for $10,000, for extensions and improvements in the street-lighting system.

ALBANY, GA. — The South Georgia Power Company will build 200 miles of 44,000 volt and 11,000 volt transmission lines. The Columbus Electric & Power Company will also build a 110,000 volt line from Columbus to Americus, connecting system of Columbus Electric & Power Company and South Georgia Power Company together.

ATLANTA, GA.—The Pullman Company, Pullman Building, Chicago, Ill., will install electric power equipment in its proposed local car shops. The entire project will cost close to $1,000,000.

HEIDELBERG, MISS.—The City State Investment Company has secured a franchise for light and power service, and will soon begin the construction of an electric light and power plant to cost about $45,000.

OCEAN SPRINGS, MISS.—The Ocean Springs Electric Light & Ice Company has been acquired by new interests, headed by R. R. Guice. Tentative plans are under consideration for extensions and improvements, including transmission line construction.

ASHEVILLE, N. C.—The Pigeon River Power Company has made application to proceed with the construction of a proposed hydro-electric generating plant on the Big Pigeon River, near Waterville, N. C. The cost is close to $10,000,000, including power dam and steel tower transmission line.

GREENSBORO, N. C.—The North Carolina Public Service Company is arranging for the sale of a new bond issue, the fund to be used for extensions and improvements in plants and system.

HOMINY, OKLA.—The Oklahoma Utilities Company plans an expansion of its plant and of the installation of a 600 hp. Diesel engine.

HUGO, OKLA.—The Oklahoma Power Company is making improvements in this city, including the furnishing of electricity at Fort Towson, Forney, Soper, Boswell, Antlers and Hugo. A high-tension line is being made to serve Grant. Also the installation of a high pressure Westinghouse turbine and one 440 hp. Heine boiler. The ice plant will be enlarged and motor-driven ammonia compressors will be installed.

PIKEVILLE, TENN. — The Southern Cities Power Company, Chattanooga, plans the construction of a transmission line here for local light and power service. A franchise has been secured. The company will also make extensions in its transmission system in the vicinity of Mooresville, Tenn.

SOUTH KNOXVILLE, TENN. — The Knoxville Power & Light Company is considering the erection of a 13,200-volt transmission line across the Tennessee River. Col. C. H. Harvey is president.

HOUSTON, TEX.—The Crane Ready Cut House Company plans the installation of electric power equipment in connection with the proposed rebuilding of its portable house manufacturing plant recently destroyed by fire with loss of about $200,000, with machinery.

NACOGDOCHES, TEX. — The Texas Power & Light Company, Dallas, plans extensions in transmission system in this section for general commercial service. A franchise has been secured. The company is also negotiating with the City Council at Waxahachie for the installation of an ornamental lighting system in the downtown section.

SHAFTER, TEX.—An electrical power plant will be installed in connection with proposed cyanide mill for the Presidio Mining Company, here, to cost about $250,000.

DALLAS, TEX.—The Dallas Power & Light Company has plans under advisement for extensions in its equipment storage and distributing plant at Park Avenue and Marilla Street, estimated to cost about $95,000.

MERCEDES, TEX.—The city commission has given to the Valley Electric & Ice

Company an order to install an ornamental lighting system in the business and residential sections. Frank C. Ludden is manager.

Pacific and Mountain States

LOS ANGELES, CAL.—The City Council has adopted an ordinance for the installation of an ornamental lighting system on Rampart Boulevard, from Temple to Sixth Street, using cast iron standards; and on La Jolla Avenue, from Melrose to Rosewood Avenue, using concrete standards. Also, on Vermont Avenue, from Slauson to Manchester Avenue, using concrete standards.

CHICO, CAL.—The Pacific Gas & Electric Company, San Francisco, has filed plans for the construction of a one-story equipment storage and distributing plant, 115 ft. x 180 ft., at Nord Avenue and First Street, estimated to cost $25,000.

GLENDALE, CAL.—The City Council is considering the installation of an ornamental lighting system in the Bellehurst district, using concrete standards.

LOS ANGELES, CAL.—The Board of County Supervisors, Court House, has adopted a resolution providing for the installation of ornamental lamps on portions of Bonita, Monte Vista and San Dimas Avenues; Exchange Place and Iglesia Street, using cast iron standards.

ONTARIO, CAL.—The City Council is considering a report of its committee for the installation of an ornamental lighting system in the downtown district.

TUCUMCARI, N. M.—The City Council is considering the installation of an ornamental lighting system in the downtown section.

RAINIER, ORE.—The Menefee Lumber Company plans the installation of electric power equipment in connection with the proposed rebuilding of its mill recently destroyed by fire with loss reported at $250,000.

BAKER, ORE. — The Eastern Oregon Light & Power Company has applied for permission to use waters from the Grande Ronde River for a proposed hydro-electric power development to cost $800,000, with transmission system.

KLAMATH FALLS, ORE.—The Southern Pacific Railroad, Portland, plans the installation of electric power equipment at its proposed local shops and terminal buildings estimated to cost $300,000.

HELPER, UTAH.—The City Council has authorized the immediate installation of an ornamental lighting system in the downtown section.

KALAMA, WASH.—The Columbia Door Company plans the installation of electric power equipment in connection with the proposed rebuilding of its lumber mill and woodworking plant, recently destroyed by fire with loss reported at $250,000.

KENNEWICK, WASH. — The Pacific Power & Light Company, Portland, Ore., plans the rebuilding of the portion of its local storage and distributing building destroyed by fire, July 6, with loss estimated at $110,000.

SEATTLE, WASH.—The City Council is considering an appropriation of $1,500,000, requested by J. D. Ross, superintendent of lighting, for extensions and improvements in the municipal electric system. About $700,000 will be used for additions in transmission lines; $500,000 for street-lighting extensions and improvements, and $225,000 for extensions and betterments in substations on James Street, West Seattle, and Spokane Street, North Seattle.

Canada

KAMLOOPS, B. C.—The ratepayers have authorized the expenditure of $60,000 on additions and improvements to the Barriere hydro-electric power plant. A. W. Jackson is city clerk.

GRAND FALLS, N. B.—A contract will be awarded in the future for the construction of a main dam, tunnel and power house.

SPRINGHILL, N. S.—The Canadian General Electric Company announced that a power plant to cost about $350,000 would be erected at Harrison's Lake, near Maccan.

Electrical Patents

Announced by U. S. Patent Office

(Issued July 6, 1926)

1,591,883. INSULATOR PIN; C. L. Peirce, Jr., Pittsburgh, Pa. App. filed May 27, 1922. Provided with a screw-threaded thimble or helix upon which the insulator is adapted to be mounted. Stock material having a substantially circular cross-sectional area is subjected to drop-forging processes to form the same into an integral pin, a portion of which is of angular cross-section, thereby economizing in material.

1,591,901. EXTENSIBLE ELECTRIC LIGHT; J. T. Watts, Chicago, Ill. App. filed Sept. 19, 1921. Using a take-up reel.

1,591,910, 1,591,911. INCANDESCENT LAMP; R. S. Burnap, Newark, N. J. App. filed July 23, 1920. Used as a source of light in moving-picture projectors and similar devices.

1,591,917. ELECTRIC SIGN CONTROLLER; F. E. Wilde, Meadowmere Park, L. I., N. Y. App. filed March 25, 1925. "Talking" signs; the control mechanism by which the letters or other characters are caused to traverse the signboard.

1,591,926. JUNCTION BOX; C. Mautner, Brooklyn, N. Y. App. filed Nov. 21, 1924.

1,591,934. TRANSFORMER; J. C. Davenport, Milwaukee, Wis. App. filed Sept. 27, 1920. Which is cooled by a body of oil. A tank adapted to contain electrical apparatus immersed in oil, a substantially horizontal imperforate heat-insulating barrier submerged below the surface of the oil, the barrier and tank being relatively of such form as to leave a space between the barrier and a wall of the tank, and a cooling pipe disposed in that space.

(Issued July 13, 1926)

1,591,953. ELECTRICAL POWER TRANSMISSION; A. U. Avera, Florence, Italy. App. filed July 13, 1922. Provision of means for permitting vehicles, such as buses, canal boats, or the like, to pass on the same side of a stationary source of power supply without interference.

1,591,974. ELECTRIC ARC LAMP; H. T. Harrison, Westminster, England. App. filed Feb. 4, 1919. Which embodies an electric motor or other rotary device for rotating the carbons, and in which the temperature of the carbons can be kept down by causing a suitable cooling medium such as a spirit flame, to play about or come in contact with the carbons.

1,592,011. PULL SOCKET CUT-OUT ARRANGEMENT; R. D. Smith, Scarsdale, N. Y. App. filed Nov. 3, 1920.

1,592,042. INSULATOR; M. H. Newman, Alameda, Cal., and W. A. Gilardin, Oakland, Cal. App. filed March 26, 1923. For two-wire low-tension service; which has the cap secured to the body, but a light tap will pinch it against the wires lying between it and the body.

1,592,077. RAIL SUPPORT; A. L. Butler, Somerville, Mass. App. filed Dec. 8, 1925. Insulating rail support adapted for use in supporting the third rail used in electric-railway systems.

1,592,111. AUTOMATIC SWITCH FOR ELECTRIC HEATERS; M. Klettner, Dresden-Alstadt, Germany. App. filed Nov. 14, 1924. For use in connection with flatirons, pots, warming plates, heating cushions, etc., and purposes to stop automatically the electric current the moment the temperature of the heater exceeds a certain limit and to start the current again automatically as soon as the temperature falls below a certain level.

1,592,113. LIGHTING SYSTEM; L. Larsen, East Orange, N. J. App. filed Oct. 11, 1923. Of the so-called present selective type, which is commonly used in theatres or elsewhere for producing various predetermined lighting effects at any time as required and in any desired sequence.

1,592,144. VIBRATOR FOR MASSAGE PURPOSES; G. J. Macaura, London, England. App. filed May 9, 1924.

1,592,222. ELECTRIC BATTERY CELL; R. Oppenheim, Levallois-Perret, France. App. filed March 30, 1923. Primary cell of the porous-positive-electrode type with colloidal coating, which is designed to allow the use of powdered porous materials for the constitution of the porous conducting mass.

1,592,223. RELAY; P. B. Parks, Oak Park, Ill., and J. Van Vulpen, Chicago, Ill. App. filed March 8, 1923. Having two pairs of fixed contacts, and a pivoted contact or bridging member on the relay armature which will be self adjusting so as to insure proper seating upon the contacts on both sides of the gaps which it bridges, and arranged to have a wiping movement.

1,592,225. ELECTRICAL TOOL HANDLE AND SWITCH; A. F. Pieper, Rochester, N. Y. App. filed Aug. 21, 1922. As commonly employed in dental work.

1,592,274. EMPLOYMENT OF CATHODE RAY OSCILLOGRAPHS; N. Kipping, London, England. App. filed June 28, 1924. To obtain an accurate representation of the wave form of an oscillating current on a cathode ray oscillograph.

1,592,303. SIGNAL BOX; C. J. Jenne, Seattle, Wash. App. filed June 25, 1923. As employed by night watchmen.

1,592,321. AUTOMATIC ELECTRICAL CUT-OUT; E. Adams, Nanty Glo, Pa. App. filed March 8, 1924. Designed for employment in connection with a triphase motor, but by slight modification may be adapted for employment in connection with other polyphase motors and which will operate automatically to break the circuit in the event of breakage of any one or more of the leads to the motor.

1,592,325. MOTOR-CONTROL SYSTEM; B. O. Austin, Wilkinsburg, Pa. App. filed Sept. 2, 1925. For governing a plurality of motors mounted upon separate vehicles, constituting a multiple-unit train.

1,592,326. COMMUTATOR; A. J. Bastian, Wilkinsburg, Pa. App. filed Aug. 14, 1924. Molded commutators for small machines.

1,592,333. ELECTRIC CURRENT COLLECTOR; G. W. Bower, Schenectady, N. Y. App. filed Dec. 1, 1925. Pantograph type; adapted for use on traveling cranes, electric mules, etc., where the head room is limited and the amount of power used comparatively light.

1,592,344. FIXTURE SUPPORT; F. C. De Reamer, Schenectady, N. Y. App. filed Jan. 24, 1921. The mounting of brackets or fixtures on walls in such manner that they can be easily removed from one position and installed in another without requiring the services of skilled help.

1,592,361. DRY BATTERY; W. F. Hendry, Ossining, N. Y. App. filed June 12, 1924. Multiple batteries in which the individual cells are connected in parallel with each other.

1,592,369. OVERHEAD TROLLEY SYSTEM; O. M. Jorstad, East Pittsburgh, Pa. App. filed April 7, 1922. Such as are subjected to great changes in temperature and other loadings.

1,592,371. SHEATH CONNECTION IN ELECTRIC CABLE SYSTEMS; W. B. Kirke, Bronxville, N. Y., and H. R. Searing, New York, N. Y. App. filed June 23, 1923. To reduce induced sheath currents and sheath losses; to avoid the cumulative effect of the induced voltages, and to avoid the production of electric arcs.

1,592,375. VARIABLE-DRIVE MECHANISM FOR COIL-WINDING MACHINES AND THE LIKE; D. Macadie, London, England. App. filed Jan. 16, 1923.

1,592,390. ELECTRIC CONTROLLER; M. Staley, Brooklyn, N. Y. App. filed April 16, 1923. Remote controllers for electric elevators.

1,592,454. ELECTRICAL CONDUIT FITTING; O. A. Frederickson, Hartford, Conn. App. filed March 5, 1925. A connector fitting having means whereby it may be attached to a box or pipe and a well-grounded connection may be made with a conduit end, which fitting is so constructed that it may be used with a cap or channel of small size without leaving any opening between the outer face of the cap and the fitting, or may be used with a cap or channel of large size without offering any obstruction to the passage of wires through the interior of the conduit.

1,592,455. FLASH-LIGHT MECHANISM; E. H. Freeman, Wilmette, Ill. App. filed July 23, 1923. With self-contained oscillating generator.

1,592,503. HIGH-TENSION SWITCH; A. Ramsey, Evanston, Ill. App. filed Feb. 18, 1924.

1,592,512. ELECTROLYTIC APPARATUS; W. G. Allan, Toronto, Ontario, Canada. App. filed April 8, 1921. For electrolytic generation of hydrogen and oxygen from water.